

# VAX-11/780 Installation Manual

Preliminary

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## **PREFACE**

Table P-1 lists related documentation.

**Table P-1 Related Documentation**

<b>Title</b>	<b>Document Number</b>
Diagnostic System Technical Description	EK-DS780-TD
DR780 General Purpose Interface Technical Description	EK-DR780-TD
DR780 General Purpose Interface User's Guide	EK-DS780-UG
DW780 UNIBUS Adapter Technical Description	EK-DW780-UG
FP780 Floating-Point Accelerator Technical Description	EK-FP780-TD
KA780 CPU Technical Description	EK-KA780-TD
KC780 Console Interface Technical Description	EK-KC780-TD
MA780 Multiport Memory Technical Description	EK-MA780-TD
MS780 Memory System Technical Description	EK-MS780-TD
MS780-E Memory Subsystem Technical description	EK-MS780E-TD
Power System Technical Description	EK-PS780-TD
RH780 MASSBUS Adapter Technical Description	EK-RH780-TD
TB/Cache/SBI Control Technical Description	EK-MM780-TD
VAX-11/780 Diagnostic System User's Guide	EK-DS780-UG

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## **PART I**

### **SYSTEM INSTALLATION**

#### **WARNING**

THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND IF NOT INSTALLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE INTERFERENCE TO RADIO COMMUNICATIONS. IT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS A COMPUTING DEVICE PURSUANT TO SUBPART J OR PART 15 OF FCC RULES, WHICH ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST SUCH INTERFERENCE WHEN OPERATED IN A COMMERCIAL ENVIRONMENT. OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA MAY CAUSE INTERFERENCE IN WHICH CASE THE USER AT HIS/HER OWN EXPENSE MAY BE REQUIRED TO TAKE MEASURES TO CORRECT THE INTERFERENCE.

BLANK

## CHAPTER 1 STANDARD SYSTEM INSTALLATION

### 1.1 UNPACKING AND INSPECTION

#### WARNING

Equipment deskidding is a two-person procedure. Exercise extreme care to prevent the cabinet from rolling uncontrolled down the ramps or off either side of the pallet when releasing the leveling feet. All leveling feet must be fully retracted before deskidding.

1. Deskid the equipment per the instructions on the boxes.
2. Remove the shipping/accessory list in the "OPEN ME FIRST" box and inventory the contents of all boxes against the shipping list.
3. Notify the branch manager or supervisor of any missing or incorrect items.

#### NOTE

Advise the customer to contact the carrier about any missing items.

4. Inform the branch service manager of the DIGITAL Traffic and Shipping Department if the carrier does not have the missing items.
5. Unpack the equipment per the attached instructions.

### 1.2 INSTALLATION

#### NOTE

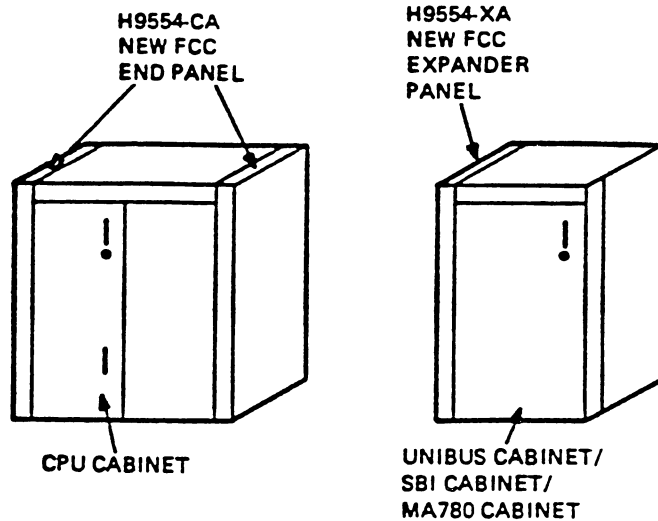
End panel and expander panel part numbers MUST be checked per Figures 1-1 and 1-2 PRIOR to installation to ensure that correct hardware will be used.

Install the equipment per the System Installation Procedure, Figure 1-3.

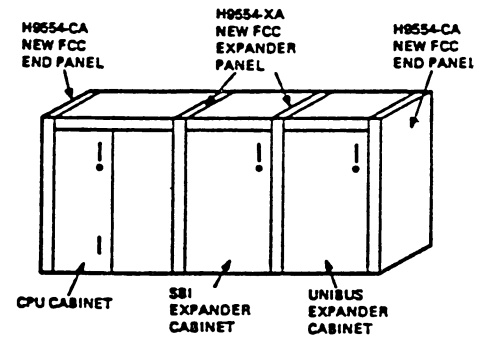
A. END AND EXPANDER PANEL ARRANGEMENT AS SHIPPED WITH FCC-VERIFIED OPTIONS

NOTES

1. CPU CABINETS COME WITH TWO END PANELS
2. EXPANDER CABINETS COME WITH ONE EXPANDER PANEL



B. END AND EXPANDER PANEL ARRANGEMENT OF AN INSTALLED SYSTEM COMPRISED OF ALL FCC-VERIFIED CABINET OPTIONS

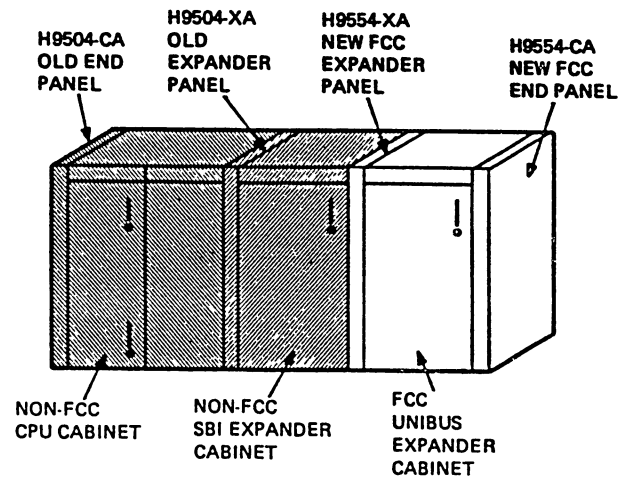


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Figure 1-1 End Panel and Expander Panel Usage in FCC-Verified Systems

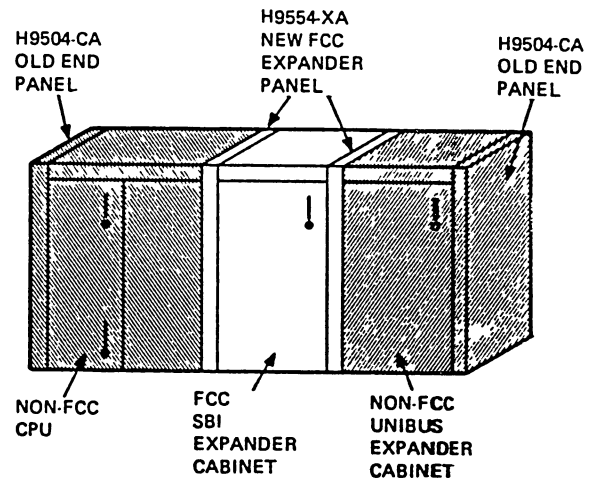
- A. END PANEL AND EXPANDER CONFIGURATION OF A SYSTEM COMPRISED OF NON-FCC VERIFIED CPU AND SBI CABINETS WITH AN FCC UNIBUS CABINET ADDED TO THE RIGHT SIDE

**NOTE**  
THIS CABINET CONFIGURATION REQUIRES ADDITION OF AN FCC-VERIFIED END PANEL TO THE RIGHT SIDE OF THE UNIBUS CABINET. NOTE THE OLD END WHICH WAS ON THE RIGHT SIDE OF THE SBI CABINET MUST BE DISCARDED.



- B. END PANEL AND EXPANDER PANEL CONFIGURATION OF A SYSTEM COMPRISED OF NON-FCC CPU AND UNIBUS CABINETS WITH AN FCC SBI CABINET IN THE MIDDLE

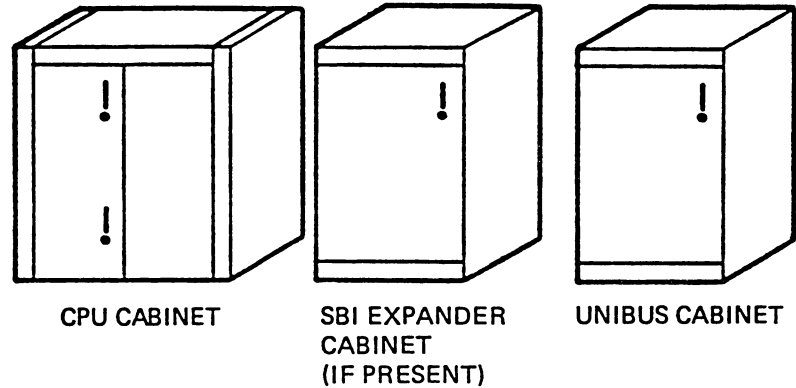
**NOTE**  
THIS CONFIGURATION REQUIRES ADDITION OF AN FCC EXPANDER PANEL FOR THE RIGHT SIDE OF THE UNIBUS CABINET. THE OLD EXPANDER KIT WHICH WAS BETWEEN THE CPU AND UNIBUS CABINETS MUST BE DISCARDED.



TK-10212

Figure 1-2 End Panel and Expander Panel Usage in Partial FCC-Verified Systems

- 1 ARRANGE THE EQUIPMENT WITH THE CPU CABINET ON THE LEFT, THE SBI EXPANDER CABINET (IF APPLICABLE) IN THE MIDDLE, AND THE UNIBUS CABINET ON THE RIGHT



- 2 UNLOCK ALL CABINET LOCKS

NOTE  
KEYLOCK REQUIRES ONLY A QUARTER TURN  
TO BE LOCKED/UNLOCKED.

THE KEY CAN BE REMOVED AFTER THE  
DOOR HAS BEEN COMPLETELY CLOSED.

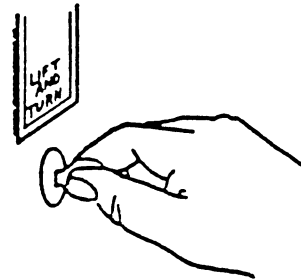
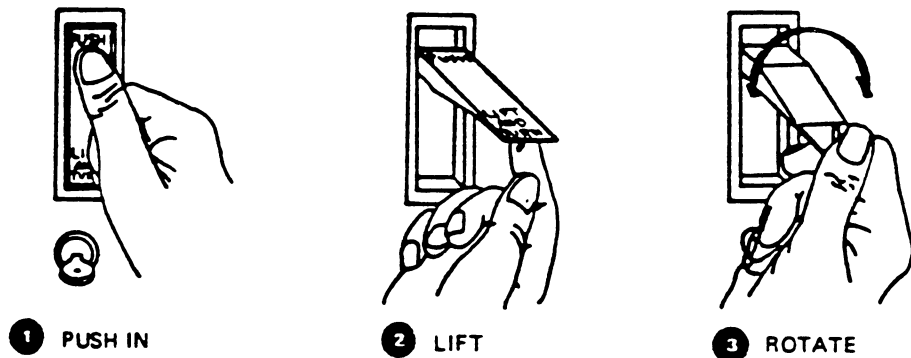


Figure 1-3 System Installation Procedure (Sheet 1 of 13)

- 3 UNLATCH THE UNIBUS SBI EXPANDER CABINET, IF PRESENT, AND THE CPU CABINET DOORS BY PUSHING AT THE TOP OF THE HANDLES AND THEN LIFTING AND TURNING THE HANDLES UNTIL THE DOORS CAN BE OPENED



TK-10211

- 4 UNHINGE AND REMOVE ALL FOUR CPU CABINET DOORS, THE FRONT AND REAR SBI EXPANDER CABINET DOORS, AND THE UNIBUS CABINET FRONT DOOR

- 5 UNLATCH THE UNIBUS CABINET BACK COVER PANEL AND THEN LIFT IT UP AND AWAY FROM THE CABINET

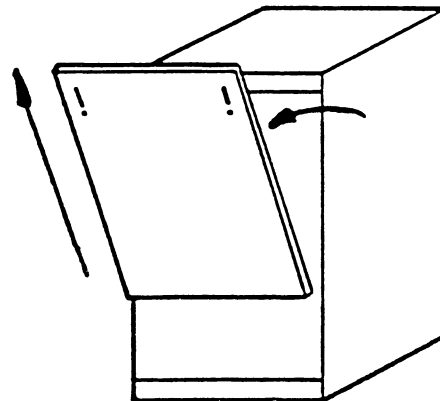
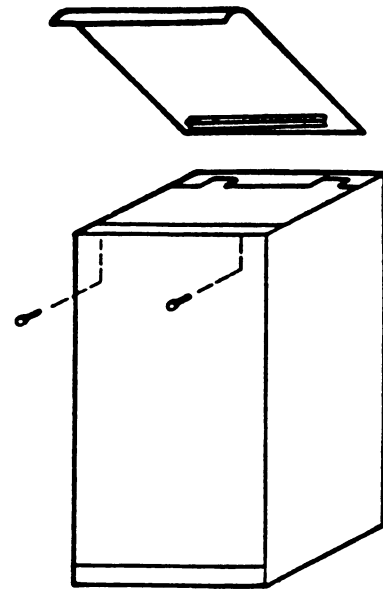


Figure 1-3 System Installation Procedure (Sheet 2 of 13)

6

REMOVE 2 SCREWS FROM UNDERNEATH THE UNIBUS CABINET BACK TOP HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER



NOTE  
REAR OF UNIBUS  
EXPANDER CABINET  
SHOWN.

TK-10210

7

REMOVE 2 SCREWS FROM UNDERNEATH THE SBI EXPANDER CABINET BACK TOP HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER

8

REMOVE 2 SCREWS FROM UNDERNEATH THE CPU CABINET BACK TOP HORIZONTAL CROSSMEMBER AND THEN LIFT AND REMOVE THE TOP COVER

Figure 1-3 System Installation Procedure (Sheet 3 of 13)



9

REMOVE 12 1/4-20 NUTS FROM THE CPU CABINET RIGHT FRONT AND BACK VERTICAL RAILS AND THEN REMOVE THE RIGHT END PANEL

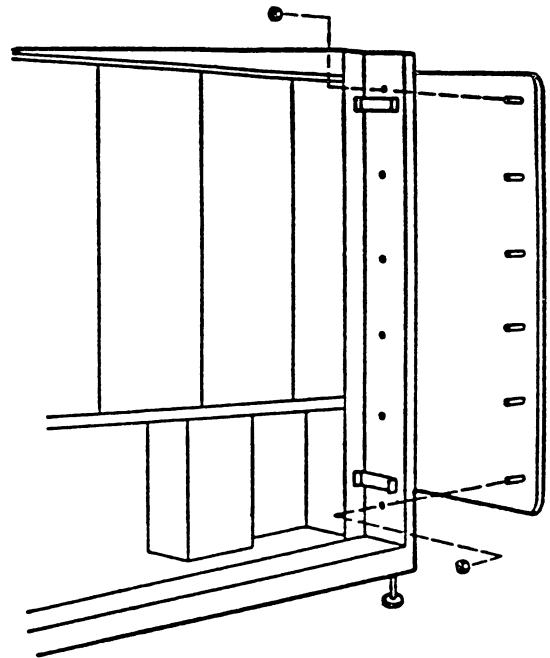


FIG 1-3-10

10

REMOVE 12 1/4-20 BOLTS AND NUTS FROM THE SBI EXPANDER CABINET LEFT FRONT AND BACK VERTICAL RAILS AND THEN REMOVE THE JOINER PANEL

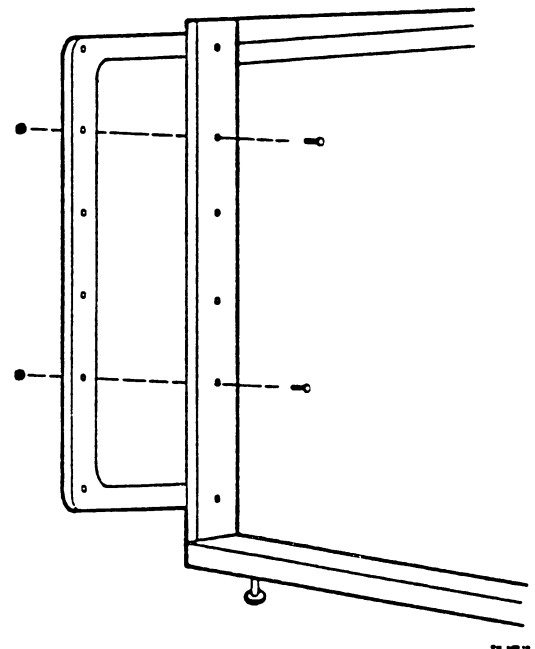


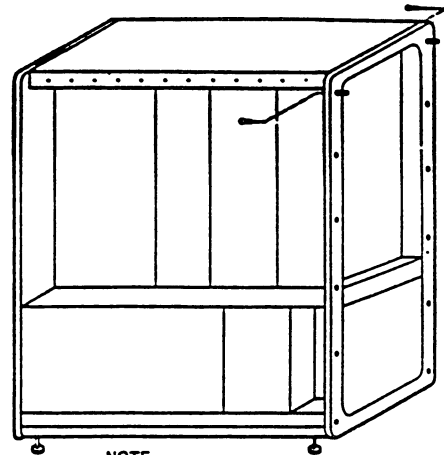
FIG 1-3-11

Figure 1-3 System Installation Procedure (Sheet 4 of 13)

- 11 LOOSELY ATACH THE JOINER PANEL REMOVED FROM THE SBI EXPANDER CABINET TO THE RIGHT END OF THE CPU CABINET WITH TWO 1/4-20 BOLTS INSERTED FROM THE CPU CABINET SIDE OF THE JOINER PANEL

NOTE

DO NOT USE NUTS AT THIS TIME TO ATTACH THE JOINER PANEL TO THE CPU CABINET



NOTE  
FRONT OF CPU  
CABINET SHOWN

- 12 POSITION THE SBI EXPANDER CABINET AGAINST THE CPU CABINET

NOTE

ADJUST THE LEVELER FEET ON BOTH CABINETS TO OBTAIN ALIGNMENT OF INTERCABINET SCREW HOLES

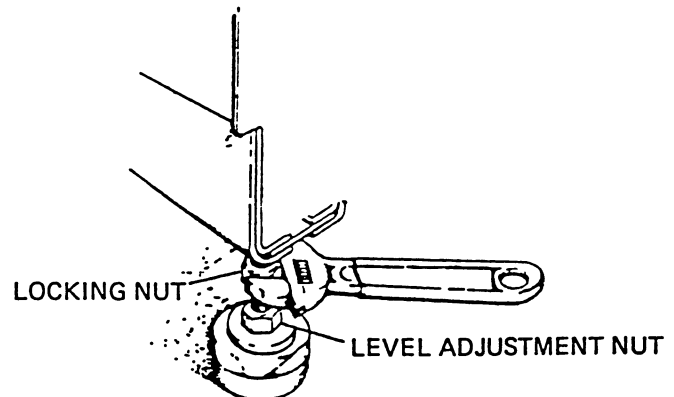


Figure 1-3 System Installation Procedure (Sheet 5 of 13)

- 13 INSTALL TEN ADDITIONAL 1/4-20 BOLTS IN THE EMPTY INTERCABINET HOLES AND THEN INSTALL 12 FINGER-TIGHTENED-ONLY 1/4-20 NUTS.

NOTE  
AFTER ALL SECURING HARDWARE HAS BEEN  
INSTALLED AND ALIGNED, TIGHTEN ALL NUTS  
WITH A RATCHET WRENCH

- 14 REMOVE 12 1/4-20 BOLTS AND 12 NUTS FROM THE UNIBUS CABINET LEFT FRONT AND BACK VERTICAL CROSSMEMBERS AND THEN REMOVE THE JOINER PANEL

- 15 LOOSELY ATTACH THE JOINER PANEL REMOVED FROM THE UNIBUS CABINET TO THE OPEN END OF THE SBI EXPANDER CABINET WITH TWO 1/4-20 BOLTS INSERTED FROM THE SBI EXPANDER CABINET SIDE OF THE JOINER PANEL

NOTE  
DO NOT USE NUTS AT THIS TIME TO ATTACH  
THE JOINER PANEL TO THE SBI EXPANDER  
CABINET

- 16 POSITION THE UNIBUS CABINET AGAINST THE SBI EXPANDER CABINET (IF PRESENT)

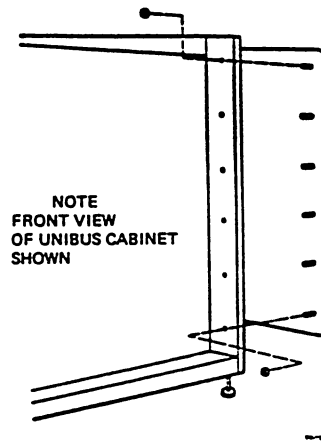
NOTE  
ADJUST THE LEVELER FEET ON BOTH CABINETS  
TO OBTAIN ALIGNMENT OF THE INTERCABINET  
BOLT HOLES

- 17 INSTALL TEN ADDITIONAL 1/4-20 BOLTS IN THE EMPTY INTERCABINET HOLES AND THEN SECURE THEM WITH 12 FINGER-TIGHT-ONLY 1/4-20 NUTS

NOTE  
AFTER ALL SECURING HARDWARE HAS BEEN  
INSTALLED AND ALIGNED TIGHTEN NUTS WITH  
A RATCHET WRENCH

Figure 1-3 System Installation Procedure (Sheet 6 of 13)

- 18 INSTALL THE REMOVED CPU CABINET RIGHT END PANEL ON THE OPEN SIDE OF THE UNIBUS CABINET AND SECURE IT WITH 12 1/4-20 NUTS



- 19 REINSTALL THE CPU CABINET TOP COVER AND SECURE IT WITH TWO 10-32 SCREWS
- 20 REINSTALL THE UNIBUS CABINET TOP COVER AND SECURE IT WITH TWO 1/4-20 SCREWS
- 21 REINSTALL THE SBI EXPANDER CABINET TOP COVER AND SECURE IT WITH TWO 10-32 SCREWS

Figure 1-3 System Installation Procedure (Sheet 7 of 13)

22

CHECK THAT NO BRAIDED RFI  
SHIELDING AND SECURING CLIPS ARE  
DAMAGED OR MISSING

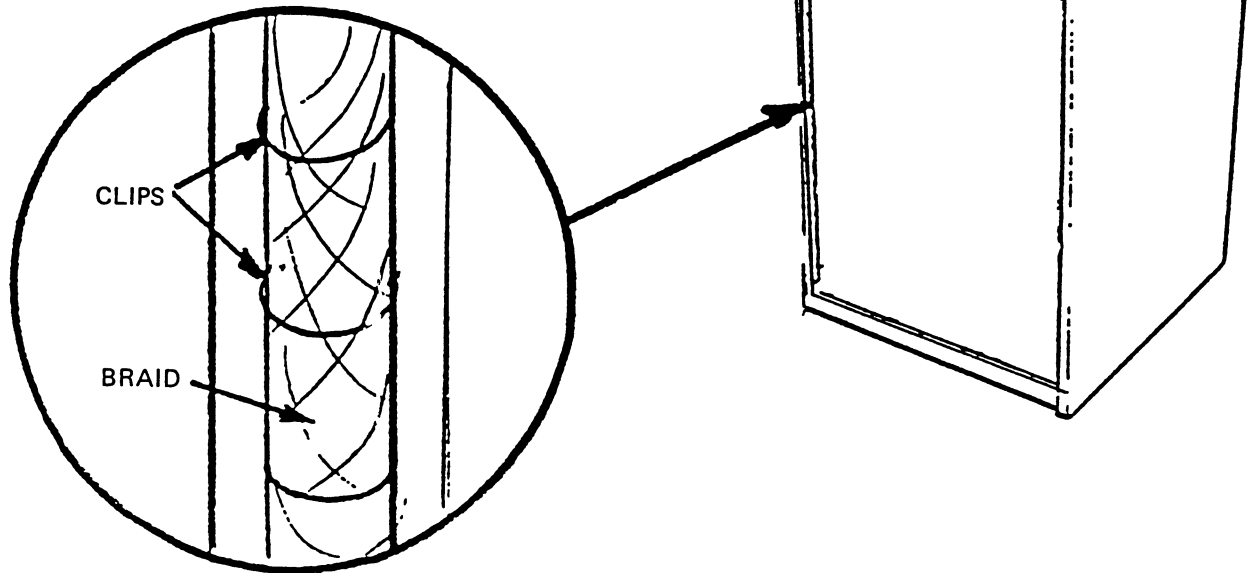
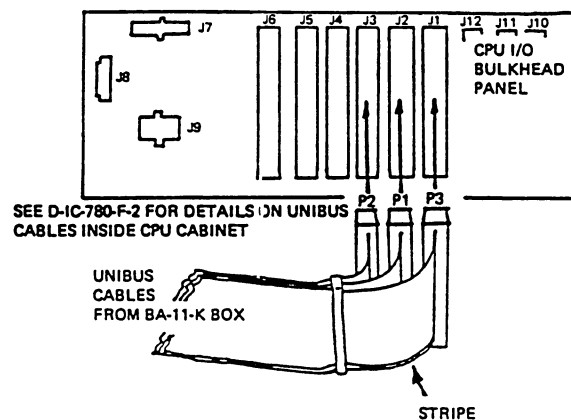


Figure 1-3 System Installation Procedure (Sheet 8 of 13)

- 23 INSTALL THE THREE UNIBUS CABLES AND CONNECT P2, P1, AND P3 OF THE THREE UNIBUS CABLES FROM THE BA11-K BOX IN THE UNIBUS EXPANDER CABINET TO JACKS J3, J2, AND J1, RESPECTIVELY, ON THE CPU CABINET SIDE I/O BULKHEAD PANEL

NOTE  
IF AN SBI EXPANDER CABINET IS PRESENT,  
ROUTE THE THREE UNIBUS RIBBON CABLES  
THROUGH THE BOTTOM OF THE SBI CABINET  
AND CONNECT THEM AS DESCRIBED ABOVE.

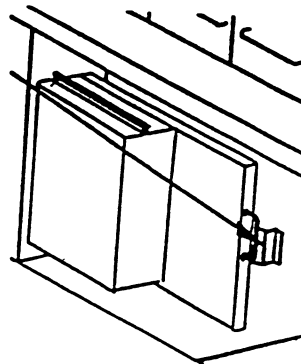


- 24 CONNECT THE DIGITAL POWER CONTROL BUS CABLE (SHIPPED IN THE BOTTOM OF THE UNIBUS CABINET) BETWEEN J8 ON THE 877 POWER CONTROLLER IN THE UNIBUS CABINET TO J8 ON THE CPU CABINET SIDE I/O BULKHEAD PANEL

IF AN SBI CABINET IS PRESENT CONNECT THE DIGITAL POWER CONTROL BUS CABLE (SHIPPED IN THE BOTTOM OF THE SBI CABINET) FROM J4 OF THE 869 POWER CONTROLLER IN THE SBI CABINET TO J8 OF THE CPU CABINET SIDE I/O BULKHEAD PANEL. NEXT, CONNECT THE POWER CONTROL BUS IN THE UNIBUS EXPANDER CABINET FROM J8 OF THE 877 POWER CONTROLLER IN THE UNIBUS CABINET TO J8 OF THE SBI CABINET SIDE I/O BULKHEAD PANEL

Figure 1-3 System Installation Procedure (Sheet 9 of 13)

- (25) REMOVE THE FLOPPY DRIVE ASSEMBLY SHIPPING LOCK



- (26) REFER TO PART II, OPTIONS INSTALLATION, FOR ADDITIONAL INSTALLATION PROCEDURES
- (27) WHEN OPTION INSTALLATION IS COMPLETE, CHECK ALL INTERNAL AND EXTERNAL CABLING AND REINSTALL CABINET DOORS. SECURE THE LOCKS
- (28) REINSTALL ALL DOORS AND COVERS

Figure 1-3 System Installation Procedure (Sheet 10 of 13)

29

CHECK DOOR/COVER-TO-CABINET RF SEAL CONTINUITY BY INSERTING A THIN STRIP OF PAPER BETWEEN THE DOOR/COVER-TO-CABINET SEAM AND CHECKING FOR RESISTANCE AS THE PAPER STRIP IS MOVED ALONG THE SEAM. IF THERE IS NO RESISTANCE THE DOOR/COVER-TO-CABINET SEAM WILL NOT PROVIDE AN EFFECTIVE RF SEAL DURING EQUIPMENT OPERATION AND, THEREFORE, MUST BE ADJUSTED UNTIL A PROPER RF SEAL IS ATTAINED

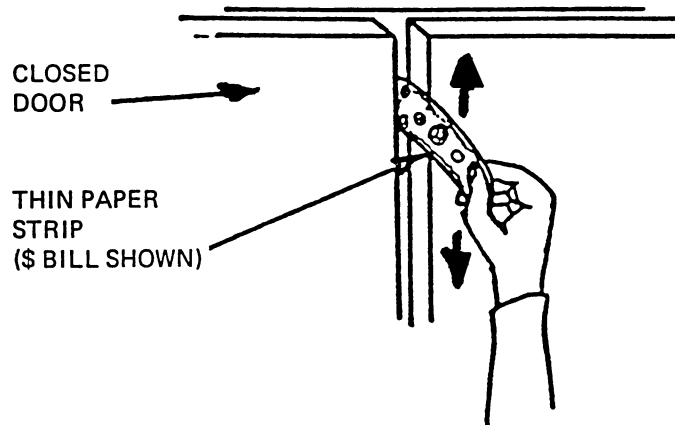


Figure 1-3 System Installation Procedure (Sheet 11 of 13)



- 30 CHECK THAT THE EQUIPMENT DOORS AND COVERS ARE ALIGNED ON THE CABINETS, AND ADJUST LEVELER FEET AS NECESSARY TO ACHIEVE PROPER ALIGNMENT

NOTE  
DOORS MUST BE PROPERLY ALIGNED ON  
CABINETS SO THAT RFI SUPPRESSION  
FEATURES OF CABINETS WILL REMAIN VALID

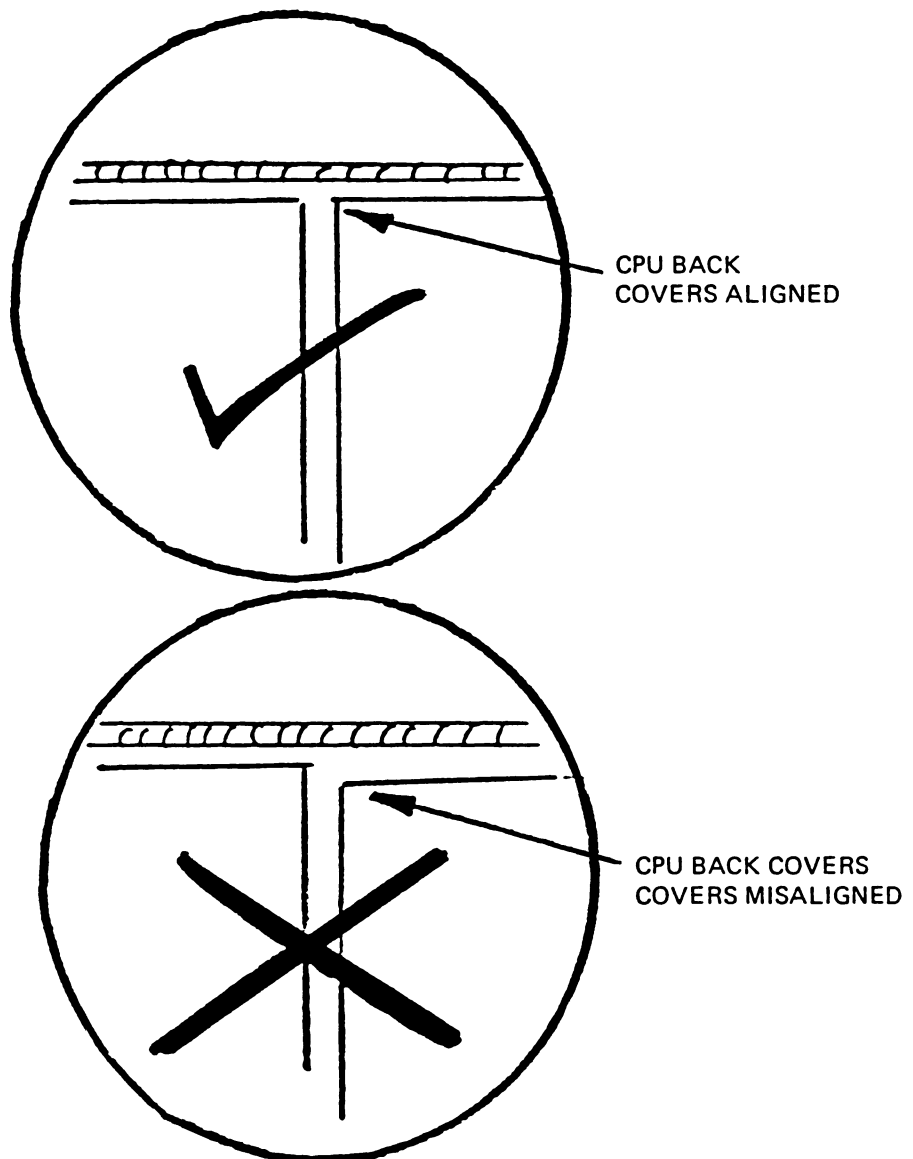


Figure 1-3 System Installation Procedure (Sheet 12 of 13)

- 31 LOCATE THE CONSOLE TERMINAL NEAR THE FRONT OF THE CPU CABINET
- 32 PLUG THE CONSOLE TERMINAL I/O CABLE INTO CONNECTOR LOCATION D OF THE I/O CONNECTOR PANEL AT THE LOWER BACK OF THE CPU CABINET
- 33 CONNECT THE CONSOLE TERMINAL POWER CABLE TO AN EXTERNAL CUSTOMER A.C. OUTLET NEAR THE TERMINAL

Figure 1-3 System Installation Procedure (Sheet 13 of 13)

### 1.3 POWER CHECK

Figure 1-4 illustrates various ac power receptacles and plugs. the CPU cabinet and the SBI expander cabinet (if present) require OP three-phase ac power. The UNIBUS expander cabinet requires single-phase ac power.

Measure the voltage between each of the three phases and neutral on the three-phase power source receptacles.

Measure the voltage between the source and neutral lines on the single-phase power source receptacles, and also to ground and between earth ground and neutral (8 volts maximum).

The ac power receptacles must meet the specifications listed in Table 1-1.

Table 1-1 AC Power Requirements

Three-Phase	Nominal	Minimum	Maximum
Vax	120	100	127
Hz	50	49	61
Hz	60	59	61
Current in amps			20
Vax	240	200	254
Hz	50	49	51
Hz	60	59	61
Current in amps			10
Single-Phase (for UNIBUS expander cabinet)			
Vax	120	90	132
Hz	50	47	63
Hz	60	47	63
Current in amps	12		20
Vax	240	180	264
Hz	50	47	63
Hz	60	47	63
Current in amps	7		10


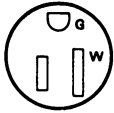


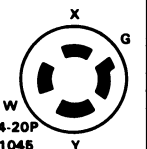
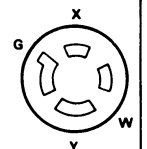
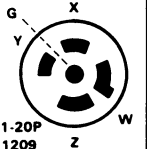
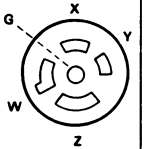

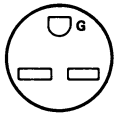
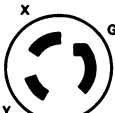
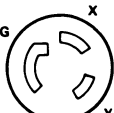
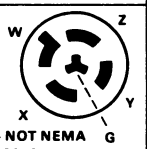
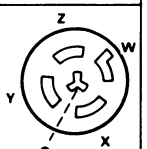
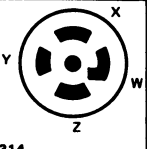
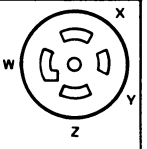
SOURCE	PLUG	RECEPTACLE
120V 15A 1-PHASE	HUBBEL #6286-C NEMA # 5-15P DEC # 90-08938 	#6282 5-15R 12-05351 
120V 30A 1-PHASE	HUBBEL #2611 NEMA # L5-30P DEC # 12-11193 	#2610 L5-30R 12-11194 
120/208-240V 20A 2-PHASE or 120/208V 20A 3-PHASE Y	HUBBEL #2411 NEMA # L14-20P DEC # 12-11046 	#2410 L14-20R 12-11046 
120/208V 20A 3-PHASE Y	HUBBEL #2511 NEMA # L21-20P DEC # 12-11209 	#2510 L21-20R 12-11210 
240V 15A 1-PHASE	NEMA # 6-15P DEC # 90-08853 	6-15R 12-11204 
240V 20A 1-PHASE	HUBBEL #2321 NEMA # L6-20P DEC # 12-11192 	#2320 L6-20R 12-11191 
240/416V 20A 3-PHASE Y	NEMA # -- NOT NEMA DEC # 12-09010 	NOT NEMA 12-11259 
120/208V 30A 3-PHASE Y	HUBBEL #2811 NEMA L21-30P DEC 12-12314 	#2810 L21-30R 12-12315 

Figure 1-4 Power Plugs and Receptacles

## CHAPTER 2 CHECKOUT AND ACCEPTANCE PROCEDURE

### 2.1 SYSTEM INITIAL TURN-ON PROCEDURE

1. Ensure that all circuit breakers (Figure 2-1) including those in the system power supplies, are OFF.
2. Ensure that all power control sense switches are in the REMOTE position.
3. Ensure that the AUTO RESTART switch on the control panel (top front of system cabinet) is in the OFF position.
4. Connect the power cable for the system cabinet to the customer power source. Connect the power cable for the UNIBUS expander cabinet to the customer power source. Connect the power cable for the console terminal and the other free-standing peripheral devices to the customer power source. Note that the system cabinet (and the SBI expander cabinet) and the RP06 disk drive require, if present, three-phase ac power. The UNIBUS expander cabinet and the remaining peripheral devices require single-phase ac power.
5. Set the main circuit breaker on the power controller to ON (up).
6. Check that the memory blower (the middle blower) is functioning.
7. Set the three secondary circuit breakers on the 869 power controller to ON.
8. Set all remaining circuit breakers (including the following) to the ON (up) position.
  - ^ H7111 battery back-up circuit breakers
  - ^ H7112 battery back-up circuit breakers (if present)
  - ^ 869 circuit breakers in the CPU cabinet and the CPU expander cabinet
  - ^ 877 circuit breakers in the UNIBUS expander cabinet
  - ^ All circuit breakers on free-standing peripheral devices
9. Make sure the console terminal power is ON. The LSI-11 HALT ENABLE switch should be set to ENABLE (up), the LSI-11 power switch set to ON (up) and the LTC switch set to OFF (down).

10. Set the five-position key switch on the control panel to the LOCAL position.

11. Make sure all blowers are functioning.

## 2.2 SYSTEM CHECK-OUT/DIAGNOSTICS PROCEDURE

The system check-out/diagnostics procedure consists of running ALL of the diskettes listed in Table 2-1.

Table 2-1 Basic VAX-11/780 Diskette Directory

RX Number	Diagnostic Title	Part Number
2	11/780 MICRODIAGNOSTIC #1	AS-E158?-DE
3	11/780 MICRODIAGNOSTIC #2	AS-E159?-DE
8	OR 11/780 MICRODIAGNOSTIC #3	AS-T409?-DE
7	VAX-11/780 DIAGNOSTIC SUPERVISOR	AS-E160?-DE
	EVSAE.EXE VAX DIAGNOSTIC SUPERVISOR	
	EVSAE.HLP SUPERVISOR HELP FILE	
	DIAGB00.EXE VAX DIAGNOSTIC SECONDARY	
	BOOT PROGRAM	
	DEFBOO.CMD	
	VAX 11 INSTRUCTION #2	AS-F748?-DE
	EVKAC.EXE FLOATING POINT INSTRUCTION	
	EVKAC.HLP HELP FILE FOR EVKAC.EXE	
	EVKAD.EXE COMPATIBILITY MODE INSTRUCTION	
	EVKAE.EXE PRIVILEGED ARCH INSTRUCTION	
	EVKAE.HLP HELP FILE FOR EVKAE.EXE	
	EVKAM.EXE VAX MEMORY USER MODE TEST	
	EVKAM.HLP HELP FILE FOR EVKAM.EXE	
61	11/780 VAX BUS + AUTOSIZER	AS-T139?-DE
	ESCAA.EXE MASSBUS CHANNEL ADAPTER DIAG.	
	ESCBA.EXE UNIBUS CHANNEL ADAPTER DIAG.	
	EVCEA.EXE VAX UNIBUS SWITCH FUNCTION	
	EVCEA.HLP HELP FILE FOR EVCAE.EXE	
	EVSBA.EXE VAX AUTOSIZER	
	EVSBA.HLP HELP FILE FOR EVSAB.EXE	
62	VAX 11 INSTRUCTION #1	AS-T140?-DE
	EVKAA.EXE VAX 11 HARDWARE INSTRUCTION	
	EVKAB.EXE VAX 11 ARCHITECTURAL INSTR	
	EVKAB.HLP HELP FILE FOR EVKAB.EXE	

The check-out/diagnostics procedure basically consists of booting the system, running microdiagnostics (RX Numbers 2 and 3 or 8), and then running macrodiagnostics.

**NOTE**

Paragraphs 2.2.1 through 2.2.3 contain only a PARTIAL, TYPICAL representation of what system check-out/diagnostics look like during actual installation of the system. The diagnostics test examples were obtained by running the CURRENT VERSION of the diskettes listed in Table 2-1. Thus, tests results obtained from use of LATER VERSION diskettes may differ somewhat from that shown below.

**NOTE**

Paragraphs 2.2.1 through 2.2.3 provide a guideline of how to perform certain diagnostic tests for the options installed per Part II of this manual.

**NOTE**

In the following procedures underlining indicates what you must type at the console terminal.

**2.2.1 Bootstrap the System**

1. Insert Console floppy disk RX1 (Part No. ZZ-ESZAB) VAX-11/780 Console Package into the floppy drive assembly per Figure 2-2.

**NOTE**

If the system has been turned OFF, turn it on by setting the keyswitch to LOCAL, and then refer to Step 2. If the system has already been powered on, and is not in the console mode, (= >>>) prompt being printed, MOMENTARILY set the LSI-11 HALT/ENABLE switch to HALT (down). This will output the PC+2 of the LSI-11 and produce an ODT prompt "@" on the console terminal.

#### NOTE

If the system is in the console mode [prints out three carets (>>>)] go to step 3.

Type 173000G to boot the floppy. These actions will load the console software CONSOL.SYS into the LSI-11 memory from the floppy, and then load the writable control store in the VAX-11/780 CPU from a WCSxxx.PAT file.

2. The following should be printed out on the console terminal:

```
CPU HALTED, SOMM CLEAR, STEP=NONE, CLOCK=NORM
RAD=HEX, ADD=PHYS, DAT=LONG, FILL=00, REL=00000000
INIT SEQ DONE
HALTED AT 00000000
```

```
(RELOADING WCS)
LOAD DONE, 0C00 MICROWORDS LOADED
VER: PCS=01 WCS=0E-10 FPLA=0E CON=V07-00-L KE780 PRESENT
```

>>>

3. The console has entered the console I/O mode of operation.
4. Remove the Console floppy diskette from the floppy disk drive per Figure 2-2.

#### 2.2.2 Running Microdiagnostics

- a. Microdiagnostic No.1 -- The RX2 Microdiagnostic No.1 floppy is used to run the following diagnostics

ESKAB VAX-11/780 (KA780) Microdiagnostic Monitor

ESKAD VAX-11/780 (KA780) Hardcore Test Stream

ESKAH VAX-11/780 (KA780) Microdiagnostic Test #1

The names of these tests are printed out as Microdiagnostic test No.1 runs.

1. Insert RX2 VAX-11/780 MICRODIAGNOSTIC #1 AS-E158Q-DE floppy disk into the the floppy disk drive per Figure 2-2.
2. Notify the console that the test (T) will enter the Control Mode (C) by typing after the three-caret prompt as follows

>>>T/C



The following will be printed at the console terminal

ZZ-ESKAB V13.1

Run two (2) passes (PA) of microdiagnostic (DI) tests by typing after the microdiagnostic (MIC>) prompt as follows

MIC>DI PA:2

The following will then be printed at the console terminal

```
ESKAD -- V13,0
01,02,03,04
NO. OF 1K BANKS OF WCS = 0004
05,06,07,08,09,0A,0B,0C,0D,0E,0F,10,11,12,13,14,15,16,17,
18,19,1A,1B,1C,1D,1E,1F,
ESKAH V13.0
20,
SYSTEM ID REGISTER = 01387FFF
KE780 FPLA PRESENT
21,22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,
2F,30,31,32,33,34,35,36,37,38,39,3A,3B,3C,
END PASS 0001
ESKAD -- V13.0
01,02,03,04,
N0. OF 1K BANKS OF WCS = 0004
05,06,07,08,09,0A,0B,0C,0D,0E,0F,10,11,12,13,14,15,16,17,
18,19,1A,1B,1C,1D,1E,1F, '
ESKAH-V13.0
20,
SYSTEM ID REGISTER = 01387FFF
KE780 FPLA PRESENT
21,22,23,24,25,26,27,28,29,2A,2B,2C,2D,2E,
2F,30,31,32,33,34,35,36,37,38,39,3A,3B,3C,
END PASS 002
MOUNT FLOPPY ZZ-ESZAD & TYPE 'DI'
```

NOTE

The second pass should be identical to  
the first pass.

MIC>

Remove Microdiagnostic #1 floppy from the floppy disk drive per Figure 2-2.

- b. Microdiagnostic Test No.3 -- The Microdiagnostic No.3 floppy is used to run the following test for systems with MS780-E memory.

### ESKAR VAX-11/780 (KA780) Microdiagnostic Test #3

1. Insert RX8 VAX-11/780 MICRODIAGNOSTIC #3 AS-E159?-DE floppy disk into the floppy disk drive per Figure 2-2.
2. After the prompt, run microdiagnostic #3 test by typing

MIC> DI PA:2

The following will then be printed at the console terminal

```
ESKAR-V0.1
3D,3E,
CPU TR = 00000010
MS780-E 64K CHIP AT TR 00000001
  LOWER CNTRLR MAX ADDRESS+1= 00800000
  UPPER CNTRLR MAX ADDRESS+1= 08000000
DW780 AT TR 00000003
RH780 AT TR 00000008
RH780 AT TR 00000009
3F,40,41,42,43,44,45,46,47,48,49,4A,4B,4C,4D,4E,4F,50,51
52
MS780-EF ID BASE ADDRESS = 20002000
LOWER CONTROLLER MAX ADDR + 1 = 00800000

  BOARD NUMBER = 00000000
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000001
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000002
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000003
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000004
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000005
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000006
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000007
    NUMBER OF CRD ERRORS = 00000000
MS780-EF IO BAS ADDRESS = 20002000
UPPER CONTROLLER MAS ADDR + 1 = 00800000
  BOARD NUMBER = 00000000
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000001
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000002
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000003
    NUMBER OF CRD ERRORS = 00000000
  BOARD NUMBER = 00000004
    NUMBER OF CRD ERRORS = 00000000
```

```

BOARD NUMBER = 00000005
NUMBER OF CRD ERRORS = 00000000
BOARD NUMBER = 00000006
NUMBER OF CRD ERRORS = 00000000
BOARD NUMBER = 00000007
NUMBER OF CRD ERRORS = 00000000

```

```

53,
MS780-E 64K CHIP AT TR00000001
M8376 ROMS OK
54,55,56,57,58,59,
STARTING FPA TESTS
5A,5B,5C,5D,5E,5F,60,61,62,63,64,65,66
END PASS 0001

```

#### NOTE

The second pass should be identical to the first pass.

MIC>

Remove the microdiagnostic #3 floppy from the floppy drive assembly per Figure 2-2.

#### NOTE

If the system being installed contains an MS780-C memory use RX3 Micro-diagnostics floppy #2 instead of of RX8.

### 2.2.3 Running Macrodiagnostics

1. Install the Standard Console floppy RX1
2. Reboot the VAX-11/780 by typing

MIC>REturn

and the following will be printed:

```

CPU HALTED,SOMM CLEAR,STEP=NONE,CLOCK=NORM
RAD=HEX,ADD=PHYS,DAT=LONG,FILL=00,REL=00000000
INIT SEQ DONE
HALTED AT 00000000

```

(RELOADING WCS)

LOAD DONE,0C00 MICROWORDS LOADED

VER: PCS=01 WCS=0E-10 FPLA=0E CON=V07-00-L KE780 PRESENT

>>>

3. Remove the Standard Console floppy
4. Install the Diagnostic Supervisor floppy RX7.

5. Type the following

```
>>>L ESSAA.EXE/S:FE00
```

```
LOAD DONE, 0001DC00 BYTES LOADED
```

```
>>>S 10000
```

```
DIAGNOSTIC SUPERVISOR. ZZ-ESSAA-6.8-794 13-JAN-1982  
14:34:36
```

```
DS>
```

7. Remove the Diagnostic Supervisor floppy

8. Run the VAX Autosizer EVSBA.EXE located on floppy RX#61.

NOTE

The Autosizer program will pass configuration information on the the Diagnostic Supervisor. It builds a series of ATTACH commands based on the hardware it found during its sizing process which it passes on the the Supervisor. This may be written to the console load media for later use.

Running the EVSBA.EXE at this time will allow you to see what devices are configured properly and what devices are not.

Fix any hardware not "seen" by the Autosizer and then rerun the Autosizer until each device is "seen". Proceed to step 9.

9. Install VAX INSTR #1 floppy RX62

10. After the DS> prompt type the following

```
DS> L EVKAB
```

```
DS> ATTACH KA780
```

and then answer the following questions:

NOTE

These questions appear only if you enter the prompt mode by typing carriage returns.

Device Link? SBI

Device Name? KA0

G-floating instructions? Y\*

H-floating instructions? Y\*

WCS last address? 0

NOTE

Type both "Ys" if the system contains a  
KE780 or both "Ns" if it does not.

and then type

DS> SEL KA0

DS> SET H,T

DS> ST/P:2

and the following will then be printed

..Program: VAX Basic Instructions Exerciser, ZZ-EVKAB,  
revision 2.5, 10 test at 14:48:50.31.  
testing: \_KA0

Accelerator type 1 is disabled.

Test 1: Integer Arithmetic and Logical Instructions  
Test 2: Variable Length Bit Field Instructions  
Test 3: Basic Branch Instructions  
Test 4: Single Bit Field Control Instructions  
Test 5: Integer Arithmetic Control Instructions  
Test 6: INDEX Instruction  
Test 7: Queue Instructions  
Test 8: Character String Instructions  
Test 9: Decimal String Instructions  
Test 10: Edit Instruction

Accelerator type 1 is enabled.

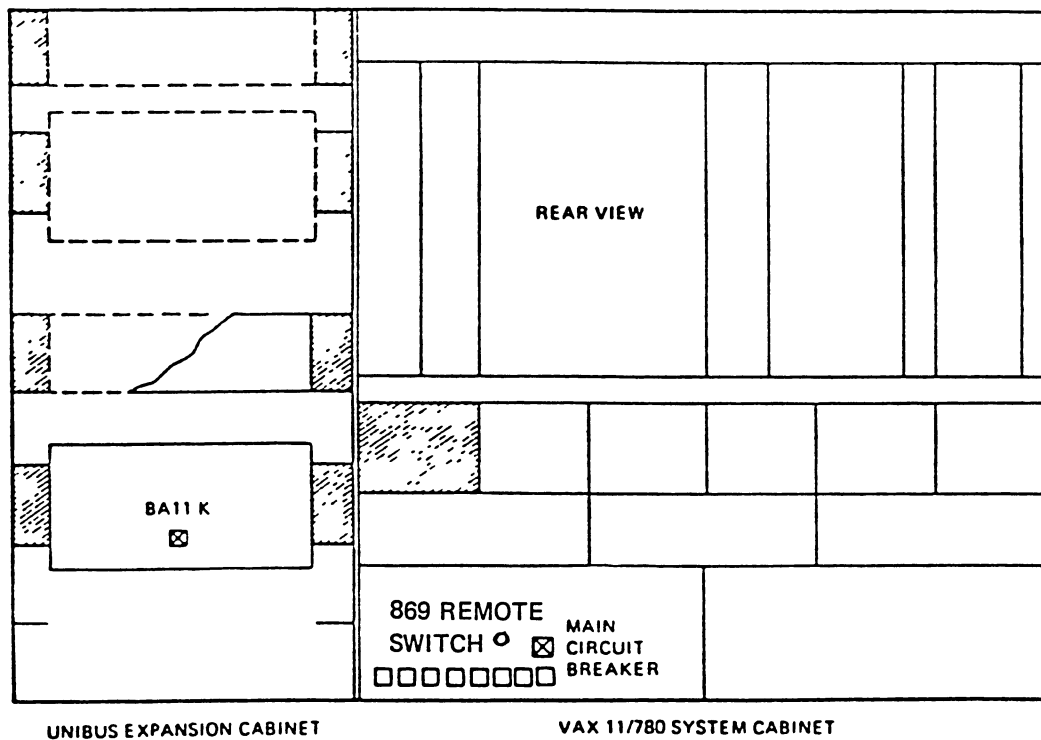
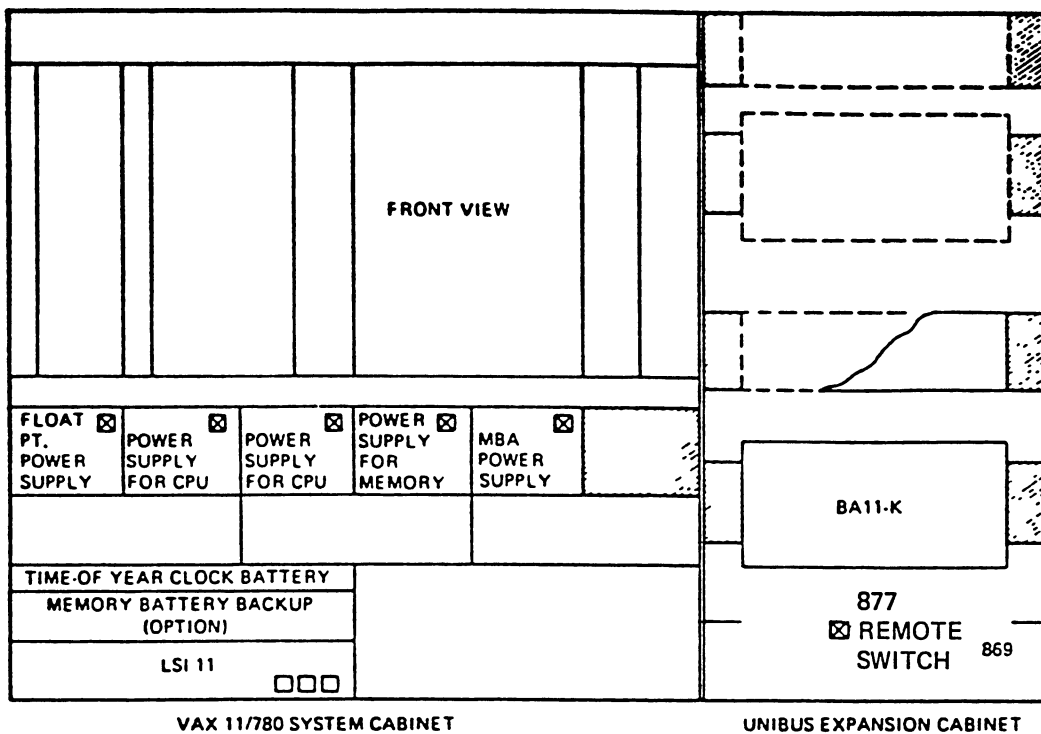
Test 1: Integer Arithmetic and Logical Instructions  
Test 2: Variable Length Bit Field Instructions  
Test 3: Basic Branch Instructions  
Test 4: Single Bit Field Control Instructions  
Test 5: Integer Arithmetic Control Instructions  
Test 6: INDEX Instruction  
Test 7: Queue Instructions  
Test 8: Character String Instructions  
Test 9: Decimal String Instructions  
Test 10: Edit Instruction

Accelerator type 1 is enabled.

.. First pass done, 0 errors detected, time is  
13-JAN-1982 14:56:46.12

Test 1: Integer Arithmetic and Logical Instructions  
 Test 2: Variable Length Bit Field Instructions  
 Test 3: Basic Branch Instructions  
 Test 4: Single Bit Field Control Instructions  
 Test 5: Integer Arithmetic Control Instructions  
 Test 6: INDEX Instruction  
 Test 7: Queue Instructions  
 Test 8: Character String Instructions  
 Test 9: Decimal String Instructions  
 Test 10: Edit Instruction  
 Test 1: Integer Arithmetic and Logical Instructions  
 Test 2: Variable Length Bit Field Instructions  
 Test 3: Basic Branch Instructions  
 Test 4: Single Bit Field Control Instructions  
 Test 5: Integer Arithmetic Control Instructions  
 Test 6: INDEX Instruction  
 Test 7: Queue Instructions  
 Test 8: Character String Instructions  
 Test 9: Decimal String Instructions  
 Test 10: Edit Instruction  
 .. End of run, 0 errors detected, pass count is 2,  
 time is 13-JAN-1982 15:04:40.80

11. Remove the VAX INSTR #1 floppy
12. Run the diskettes listed in Table 2-1 that have not been run.



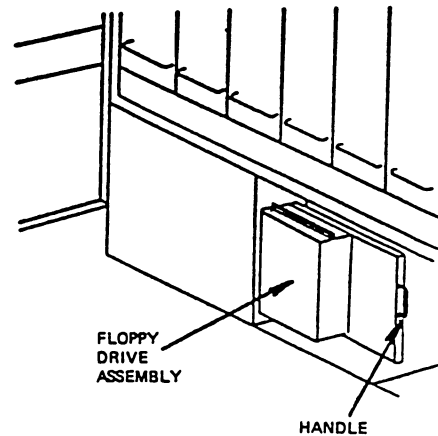
TK-7190

Figure 2-1 Circuit Breaker Locations

- 1 UNLOCK AND OPEN THE FRONT DOORS OF THE CPU CABINET
- 2 GRAB THE HANDLE ON THE SIDE OF THE DRIVE ASSEMBLY AND SWING THE DRIVE OUT PERPENDICULAR TO THE CPU CABINET

**NOTE**

FLOPPY DISKETTES CANNOT BE INSERTED IF THE DRIVE ASSEMBLY IS NOT PERPENDICULAR TO THE CPU CABINET



- 3 GRAB THE FLOPPY DISKETTE BY THE LABEL AREA AND REMOVE IT FROM THE PROTECTIVE COVER

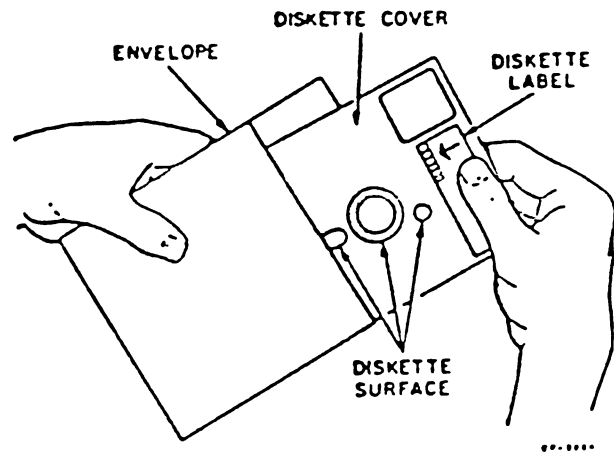


Figure 2-2 Floppy Diskette Loading Procedure (Sheet 1 of 3)



## CAUTION

HOLD THE DISKETTE ONLY BY THE LABEL AREA

DO NOT TOUCH ANY EXPOSED AREA OF THE DISKETTE

NEVER WRITE ON THE COVER THAT CONTAINS A DISKETTE

IF DISKETTE BECOMES DIRTY OR DUSTY DO NOT ATTEMPT TO CLEAN IT;  
DISPOSE OF IT

DO NOT INSERT A DIRTY OR DUSTY DISKETTE IN THE DRIVE ASSEMBLY

DO NOT PUT PAPER CLIPS ON EDGES OF THE DISKETTE

KEEP DISKETTE AWAY FROM ANY METAL OR OTHER MATERIAL THAT MIGHT BE  
MAGNETIZED

DO NOT BEND THE DISKETTE

DO NOT EXPOSE THE DISKETTE TO HEAT OR SUNLIGHT

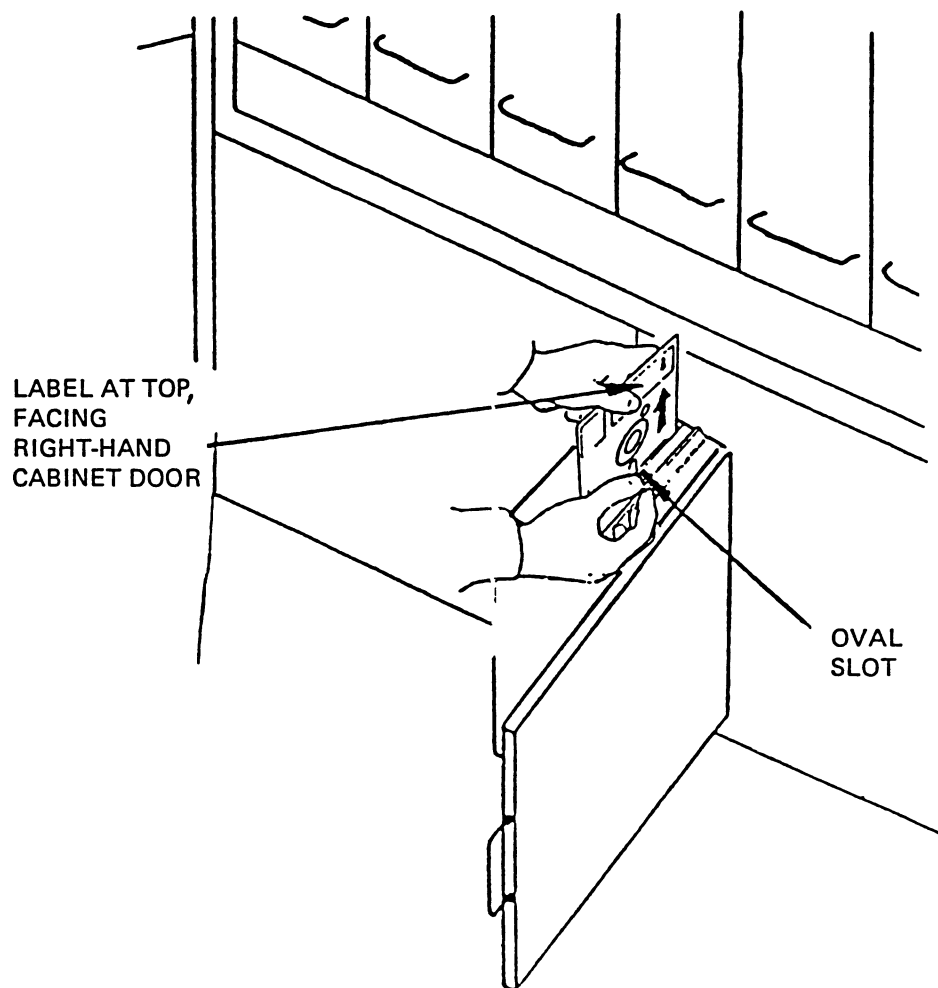
RETURN THE DISKETTE TO THE PROTECTIVE COVER WHENEVER IT IS REMOVED  
FROM THE DRIVE ASSEMBLY

STORE DISKETTES FLAT IN BOXES WHEN NOT IN USE

4

SQUEEZE DRIVE ASSEMBLY HANDLE  
WITH THUMB AND FOREFINGER;  
HANDLE WILL SPRING ASIDE

- 5 HOLD THE DISKETTE BY THE LABEL AREA AND INSERT IT INTO THE DRIVE ASSEMBLY



- 6 CLOSE THE DRIVE ASSEMBLY SLOT COVER

Figure 2-2 Floppy Diskette Loading Procedure (Sheet 3 of 3)

## **PART II**

### **OPTIONS INSTALLATION**

BLANK

## CHAPTER 3 UNPACKING AND INSPECTION -- OPTIONS

### 3.1 GENERAL

Unpacking and inspection of options consists of:

1. Setting up a static discharge system
2. Unpacking and inspecting option component parts

#### CAUTION

Small component parts such as cardcage assemblies, modules, and chips must be unpacked and inspected on the static discharge system mat to prevent equipment damage from static electricity discharges.

### 3.2 STATIC DISCHARGE SYSTEM SET-UP

#### NOTE

The following information is for the field service representative. The self-maintenance customer must follow similar precautions.

1. Unpack a VELOSTAT<sup>TM</sup>\* static discharge system (CD kit no. A2-W0299-10).
2. Unfold the VELOSTAT<sup>TM</sup> mat.
3. Attach the 15-foot ground cord to the mat snap fastener.
4. Attach the 15-foot ground cord alligator clip to a good electrical ground point in the VAX-11/780.
5. Install the wrist strap on your wrist.
6. Attach the wrist strap grounding strap to a convenient part of the mat.

### 3.3 UNPACKING -- OPTIONS

1. Make sure the shipping container is sealed and undamaged and that the correct number of containers was shipped. Report any differences to the customer and also on a LARS report form (Figure 1-1).

\*VELOSTAT is a registered trademark of 3M.

#### CAUTION

Utilize the static discharge system when handling component parts small enough to be placed on the static discharge system mat. Use of the mat will prevent equipment damage from static electricity discharges.

#### NOTE

If any items are missing the customer should check with the carrier.

2. Open the containers one at a time, starting with the one marked "Open Me First". Inventory the contents via the packing slip and record any missing items on the installation report.

#### NOTE

Packing materials (e.g. foam fillers, plastic inserts) should be retained if reshipment is contemplated.

### 3.4 INSPECTION -- OPTIONS

Inspect the equipment for any damage. If any damage is found notify the customer and also record it on the installation report. Damaged components requiring replacement should be immediately reported to the branch service manager.

#### CAUTION

Use the static discharge system when handling component parts small enough to be placed on the static discharge system mat. Use of the mat will prevent equipment damage from static electricity discharges.

#### 4.1 KU780-A WRITEABLE CONTROL STORE

The KU780-A is a 2Kb writeable control store option that consists of:

1. An M8238 module
2. KA780-A backplane connector J11 jumpers
3. M8232 clock module jumpers (W23 and W24)

##### NOTE

The Part II, Chapter 3 static discharge system procedure must be performed during unpacking, inspection, and installation to prevent damage to the KU780-A from static electricity discharges.

##### 4.1.1 KU780-A Installation

1. Turn off the system per Figure 4-1
2. Install the KU780-A per Figure 4-2

##### 4.1.2 KU780-A Diagnostics

1. Turn on the system per Figure 4-3

##### NOTE

Part I, Chapter 2 describes how to run diagnostics.

2. Run 2 passes of all microdiagnostics

#### 4.2 FP780-AA/AB FLOATING POINT ACCELERATOR

The FP780-AA/AB is a high-performance floating-point accelerator that is used for single- and double-precision floating-point instructions, plus POLY, EMOD, and MULL. It consists of:

1. Five extended hex modules (M8285, M8286, M8287, M8288, M8289)
2. M8232 module jumpers (W1 thru W14)
3. H7100 power supply
4. Interconnecting power supply cables
5. FP780-AA/AB decal

**NOTE**

The Part II, Chapter 3 static discharge system procedure must be performed during unpacking, inspection, and installation to prevent damage to the FP780-AA/AB from static electricity discharges.

**4.2.1 FP780-AA/AB Installation**

1. Turn off the system per Figure 4-1
2. Install the FP780-AA/AB per Figure 4-4

**4.2.2 FP780-AA/AB Diagnostics**

Turn on the system per Figure 4-3 and run both microdiagnostics, plus EVKAC and UETP.

**NOTE**

Part I, Chapter 2 describes how to run diagnostics.

**4.3 KE780-E EXTENDED RANGE FLOATING POINT OPTION**

The KE780-A is an extended-range floating-point option that adds Grand and Huge capabilities to the CPU. It consists of:

1. KE780-A FPLA chip (Part No. 23-065C6-00)
2. KE780-A serial tag

**NOTE**

The Part II, Chapter 3 static discharge system procedure must be performed during KE780-A unpacking, inspection, and installation to prevent damage to the KE780-A from static electricity discharges.

**4.3.1 KE780-A Installation**

**NOTE**

Prior to installation of the KE780 check that an M8238 module has been installed in slot 20 (system minimum revision level at 7) and that an M8238 has been installed in slot 18 (KU780-A installed per paragraph 4.1). The two M8238 modules provide the combined 4k of control store space required for proper operation of the KE780-A.

1. Turn off the system per Figure 4-1
2. Install the KE780-A per Figure 4-5
3. Turn on the system per Figure 4-3

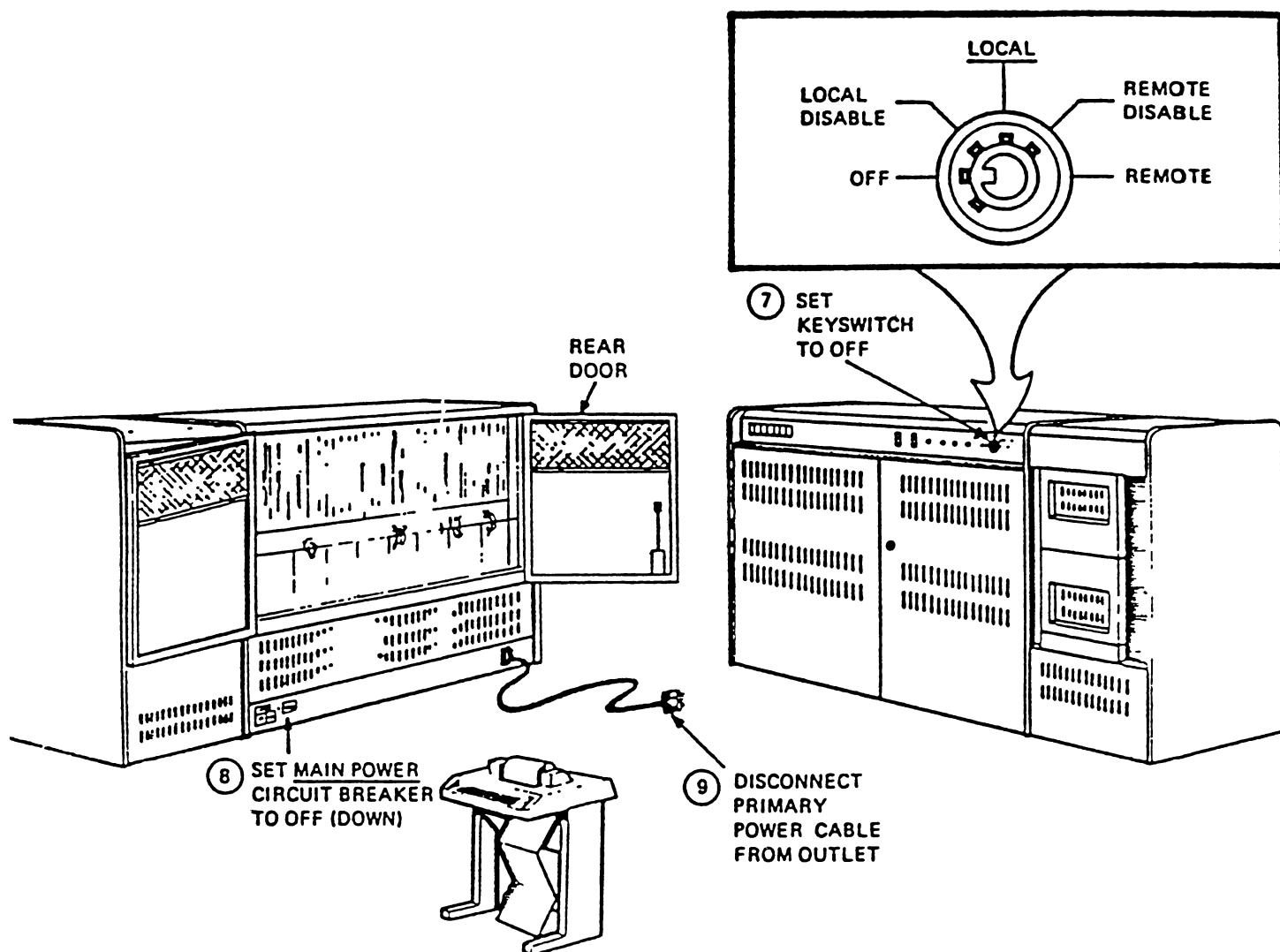


#### **4.3.2 KE780-E Diagnostics**

1. Execute microdiagnostics
2. Run the following macrodiagnostics under the diagnostic supervisor
  - a. EVKAD (VAX architectural instructions)
  - b. EVKAC (VAX floating point instructions)
  - c. EVKAD (VAX compatibility modes instructions)
  - d. EVKAE (VAX privileged architecture instructions)
3. Boot VMS

#### **NOTE**

Part I, Chapter 2 describes how to run diagnostics.

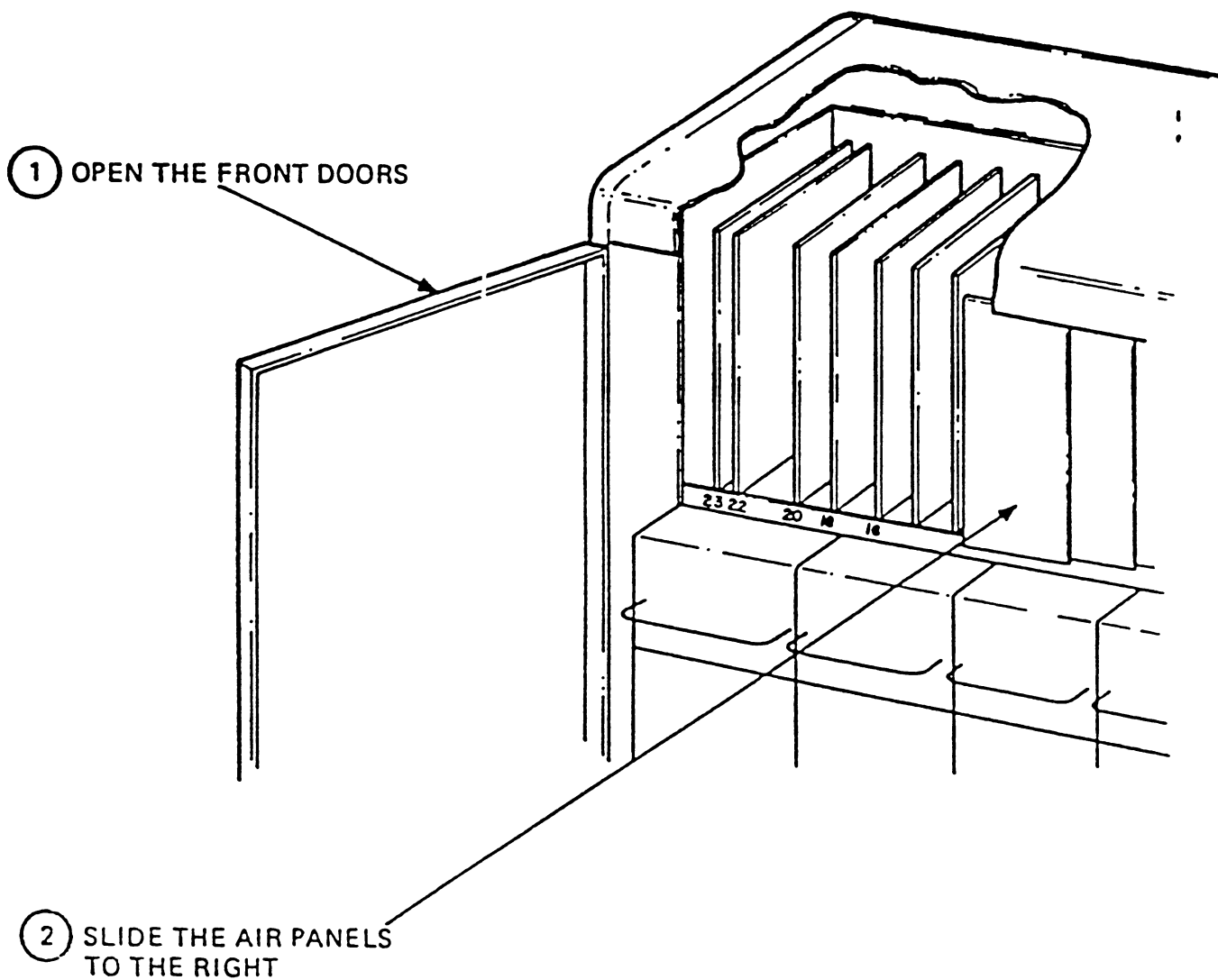


HALT THE SYSTEM BY TYPING

1. "SYSTEM" AFTER THE "USERNAME" PROMPT
2. "MANAGER" AFTER THE "PASSWORD" PROMPT
3. "@SYSSSYSTEM:SHUTDOWN" AFTER THE DOLLAR SIGN "\$" PROMPT
4. "O" AFTER THE QUESTION "HOW MANY MINUTES UNTIL SHUTDOWN?"
5. "MAINT" AFTER THE "REASON?" QUESTION
6. "NO" AFTER THE "DO YOU WANT TO SPIN DOWN THE DISKS?" QUESTION

TK-7104

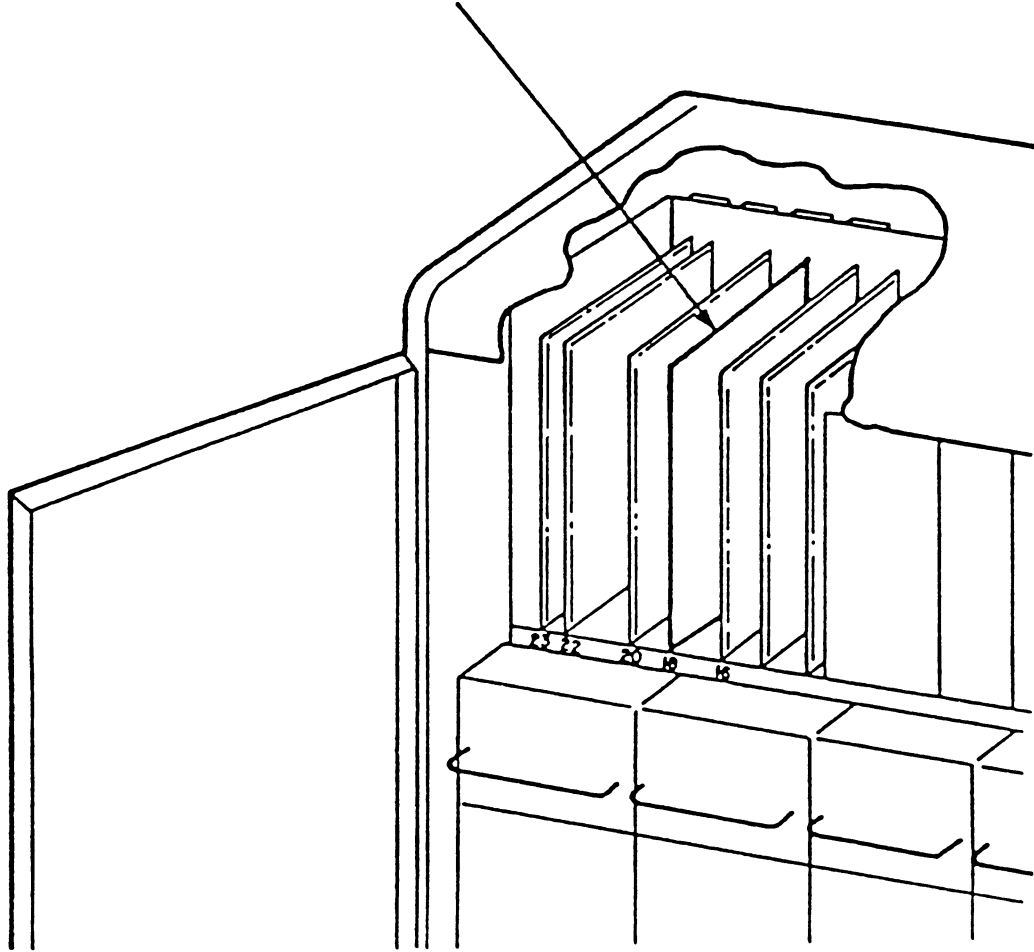
Figure 4-1 System Turn-Off Procedure



TK-10016

Figure 4-2 KU780-A Installation Procedure  
(Sheet 1 of 5)

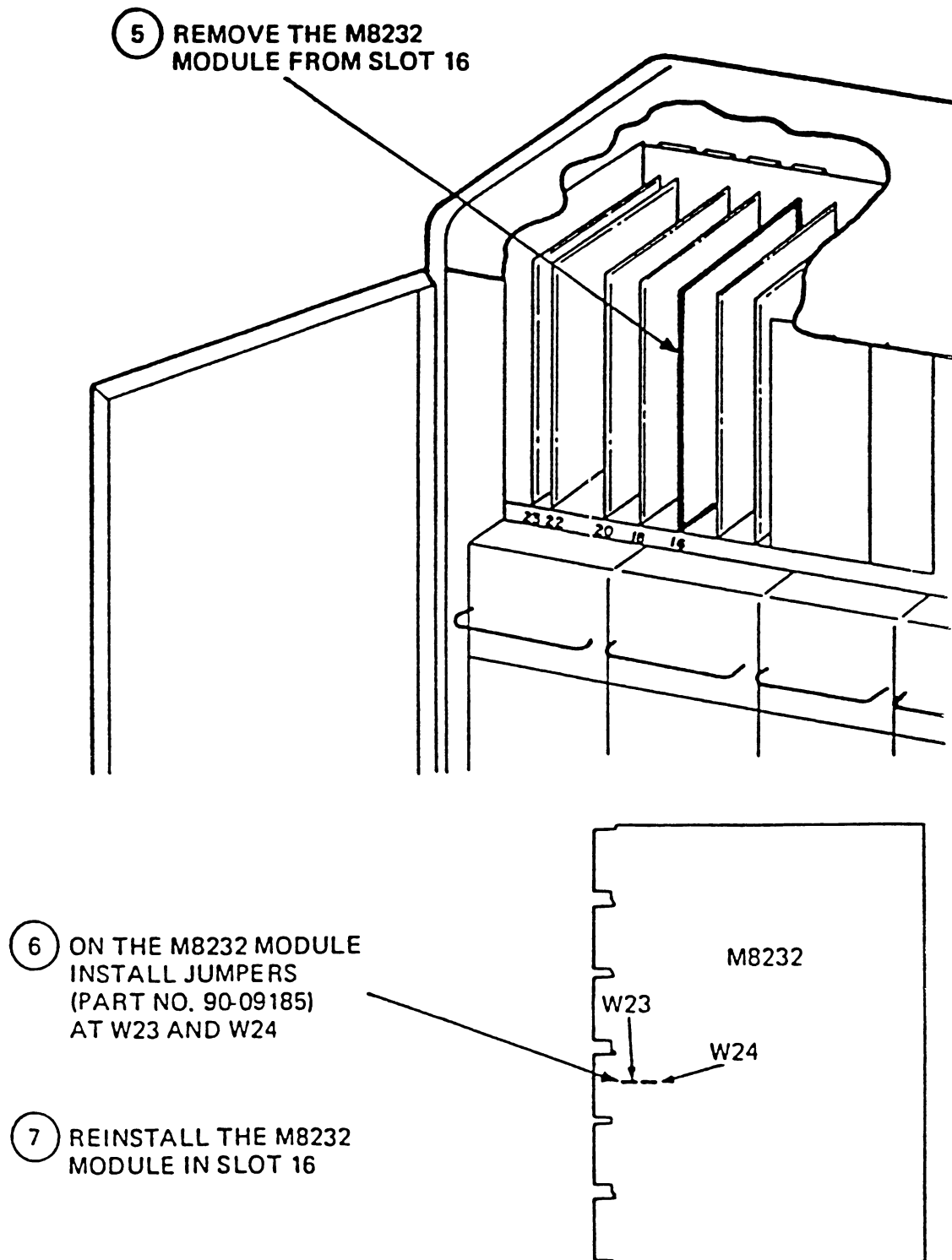
- ③ REMOVE THE BLANK MODULE  
PANEL FROM SLOT 18



- ④ INSTALL THE M8238  
MODULE IN SLOT 18

TK-10017

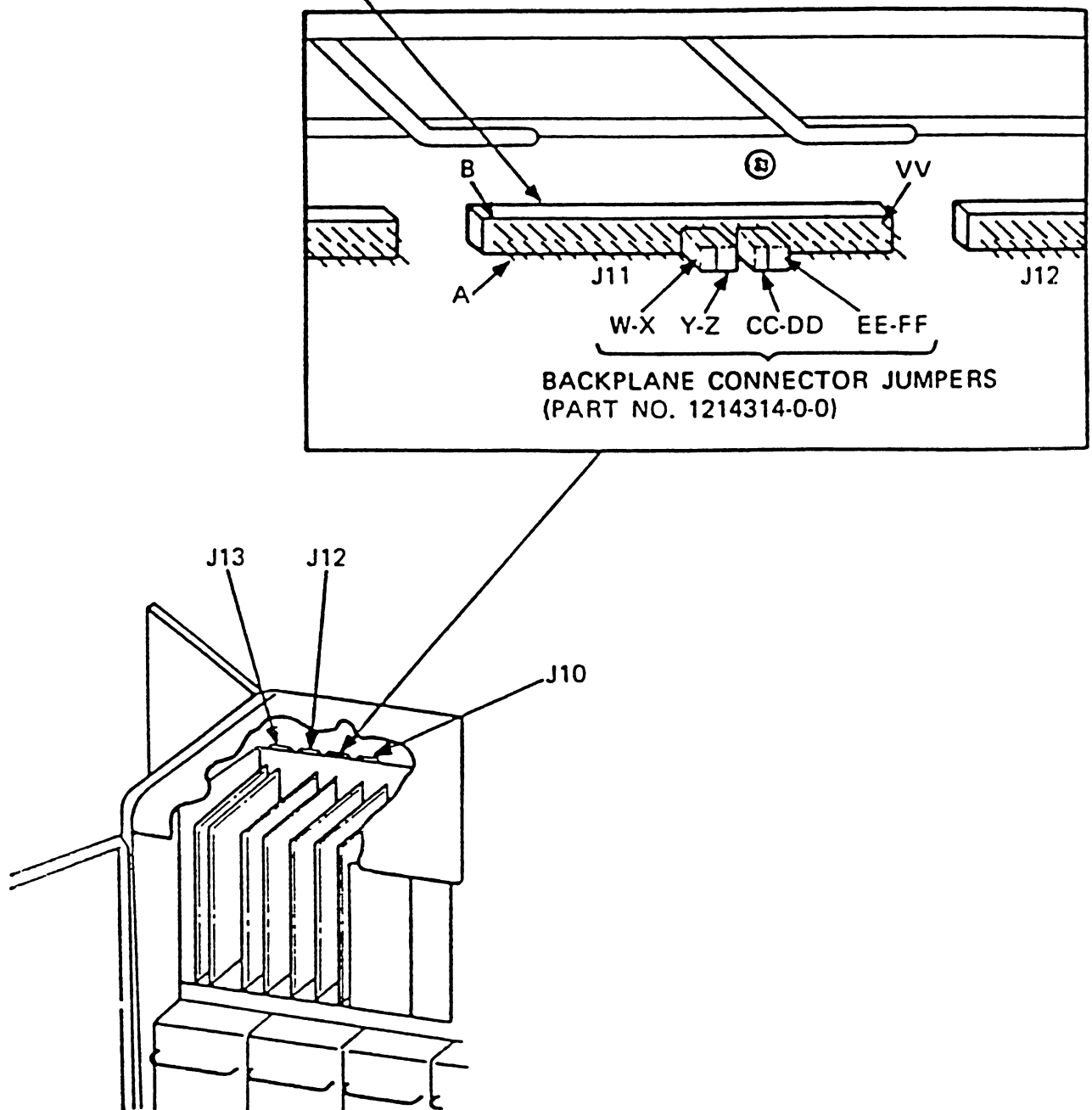
Figure 4-2 KU780-A Installation Procedure  
(Sheet 2 of 5)



TK-100111

Figure 4-2 KU780-A Installation Procedure  
(Sheet 3 of 5)

- ⑧ OPEN CABINET REAR DOORS
- ⑨ INSTALL J11 BACKPLANE CONNECTOR JUMPERS

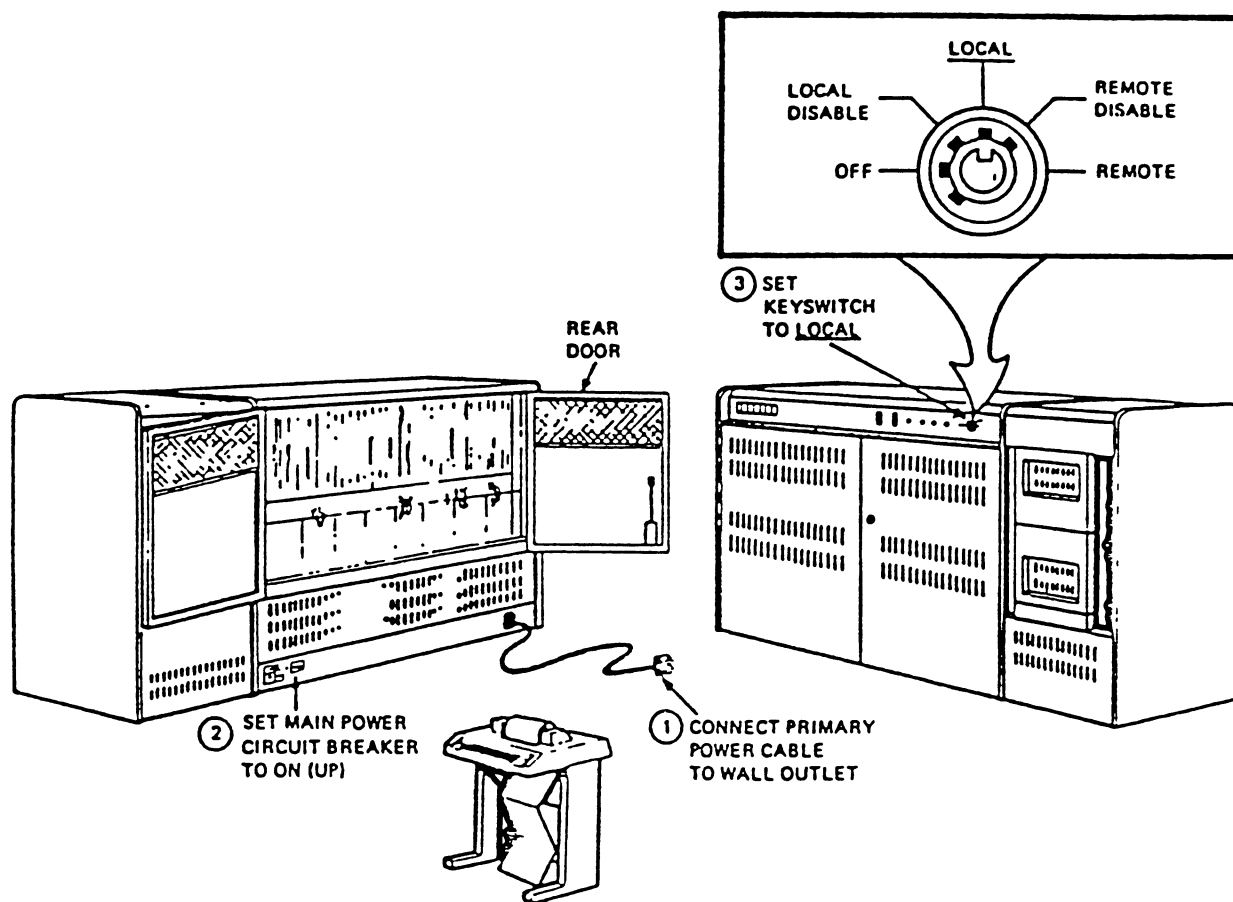


TK-10013

Figure 4-2 KU780-A Installation Procedure  
(Sheet 4 of 5)

- ⑩ AT FRONT OF CABINET UNIFORMLY REPOSITION AIR PANELS ALONG ENTIRE WIDTH OF CARDCAGE SLOT AREA
- ⑪ CLOSE CABINET DOORS
- ⑫ PERFORM KU780-A DIAGNOSTIC TESTS PER PARAGRAPH 4.1.2

Figure 4-2 KU780-A Installation Procedure  
(Sheet 5 of 5)



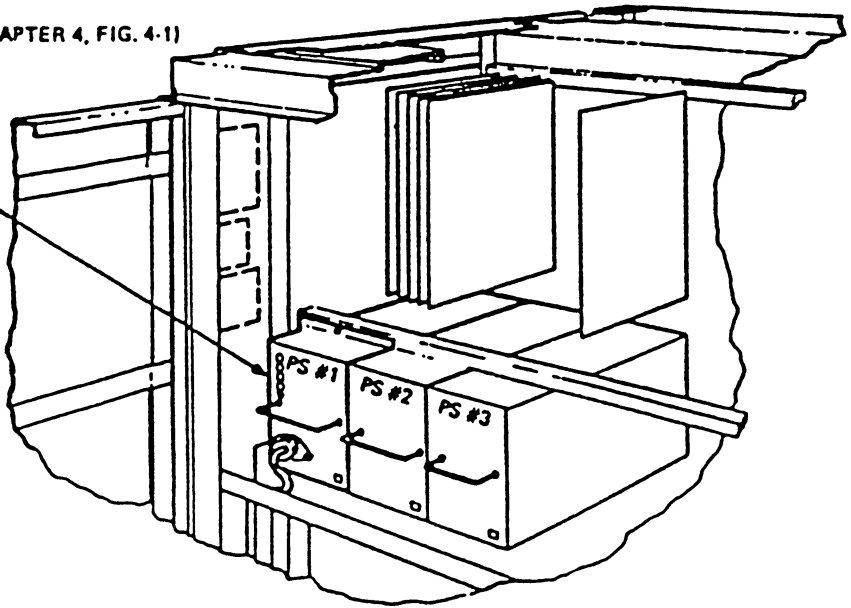
YN-7100

Figure 4-3 System Turn-On Procedure

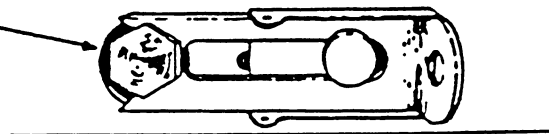


① TURN OFF SYSTEM POWER (CHAPTER 4, FIG. 4-1)

② REMOVE BLANK POWER SUPPLY PANEL FROM WHERE POWER SUPPLY NO. 1 WILL BE INSTALLED AND THEN INSTALL POWER SUPPLY NO. 1

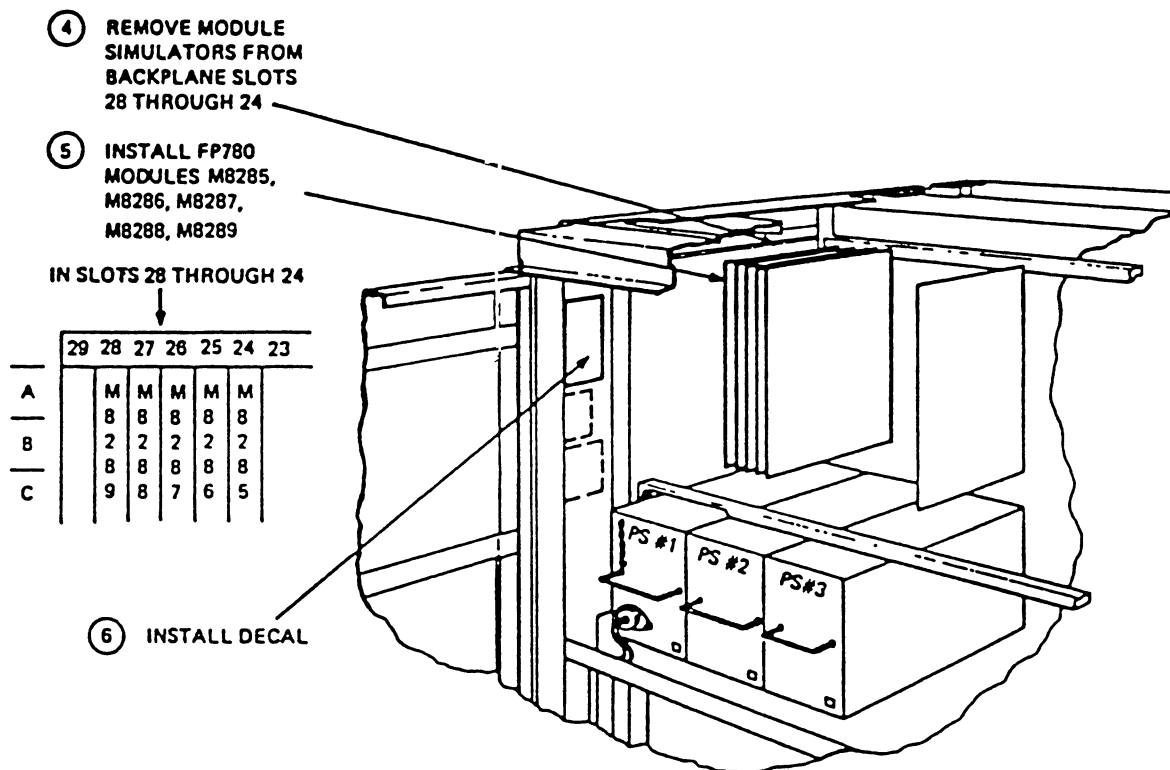


③ AT REAR OF POWER SUPPLY NO. 1 ENGAGE STUD WITH SLIDE LOCK ASSEMBLY



TR-7914

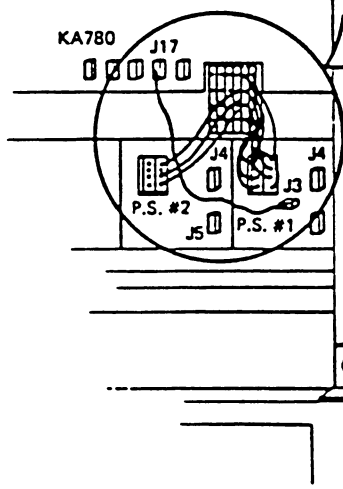
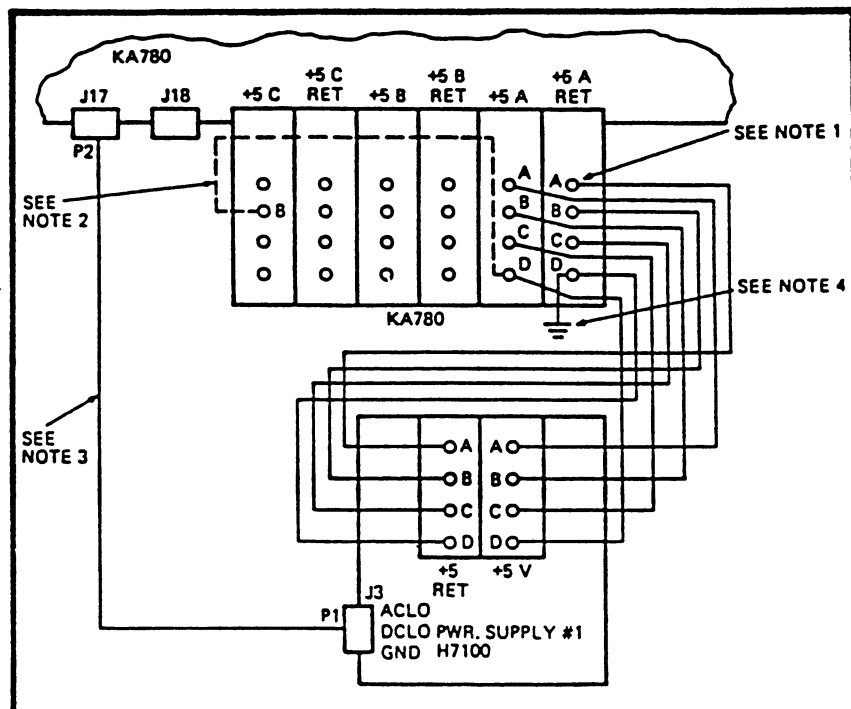
Figure 4-4 FP780-AA/AB Installation Procedure  
(Sheet 1 of 4)



TK-7100

Figure 4-4 FP780-AA/AB Installation Procedure  
(Sheet 2 of 4)

⑦ INTERCONNECT  
FP780 TO H7100



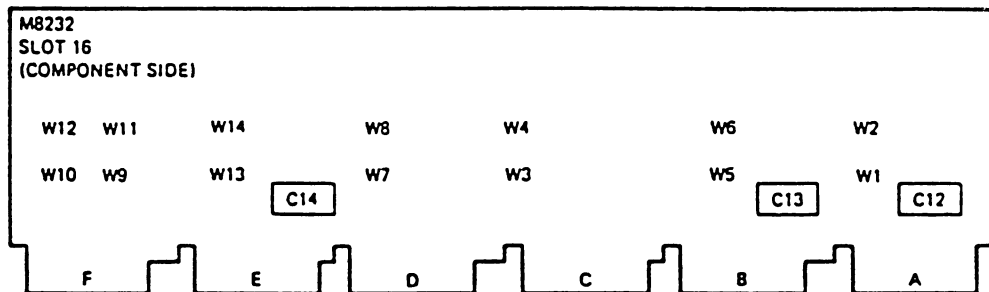
#### NOTES:

1. COVER TERMINALS WITH PLASTIC NUTS
2. REMOVE JUMPER WIRE (+5C-B TO +5A-D) WHEN FP780 IS INSTALLED
3. REMOVE END OF CABLE PLUGGED INTO J13 OF DW780 AND PLUG IT INTO J3 OF POWER SUPPLY
4. WHEN INSTALLATION OF WIRE FROM P.S. NO 1 (+5 RET-D) TO KA780 (-5 RET-D) IS COMPLETE, MAKE SURE THAT WIRE FROM KA780 (+5 RET-D) TO CAB FRAME REMAINS CONNECTED

16 3176

Figure 4-4 FP780-AA/AB Installation Procedure  
(Sheet 3 of 4)

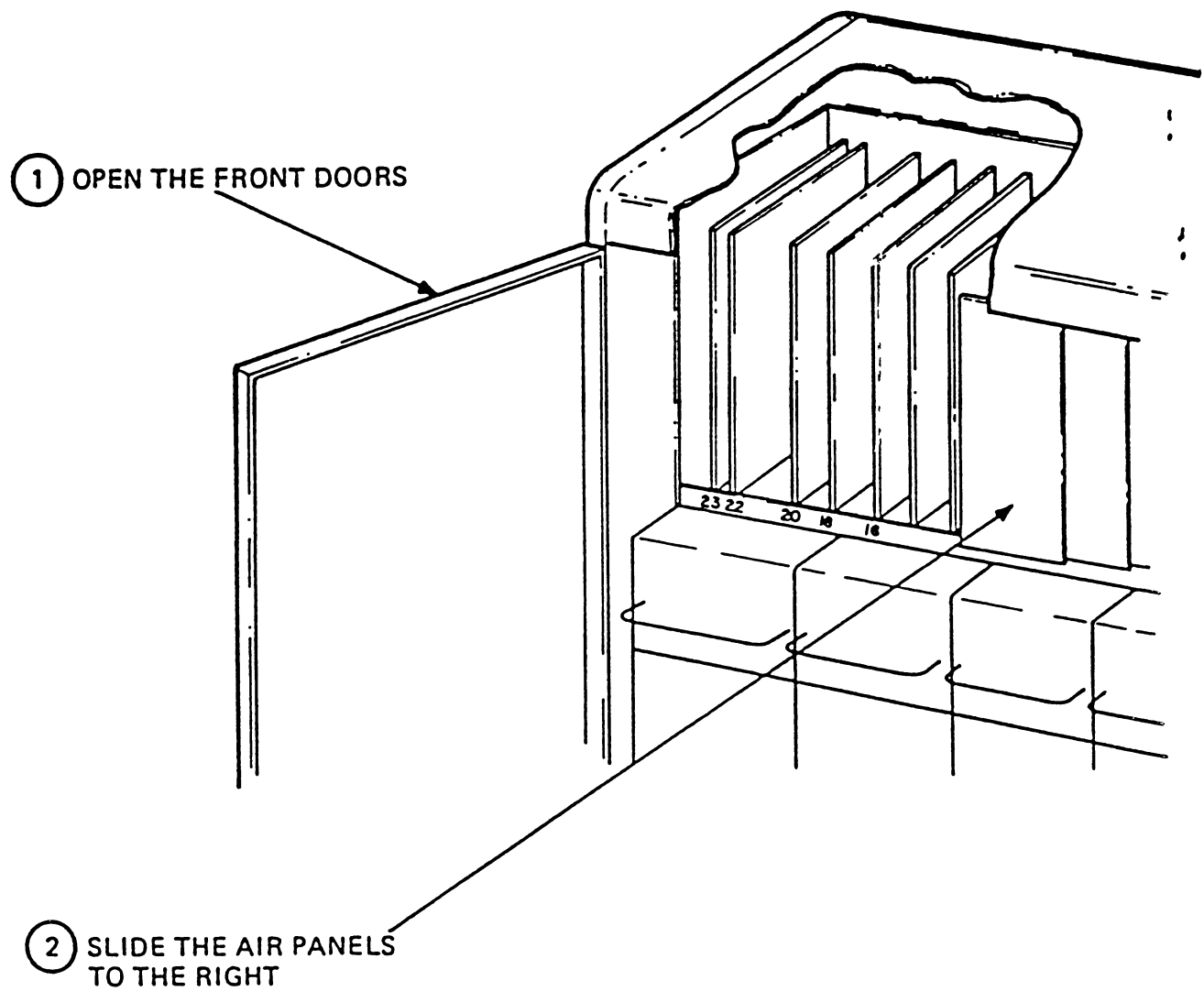
- ⑧ TORQUE GROUND AND +5 V WIRES ON POWER SUPPLY TO 30 IN POUNDS
- ⑨ CONNECT POWER SUPPLY NO. 1 AC POWER CABLE TO J1, J3, J4 OR J5 OF 869 POWER CONTROLLER
- ⑩ REMOVE M8232 AND THEN INSTALL AND SOLDER JUMPERS W1 THRU W14



TE-7106

- ⑪ REINSTALL M8232 IN BACKPLANE SLOT 16

Figure 4-4 FP780-AA/AB Installation Procedure  
(Sheet 4 of 4)

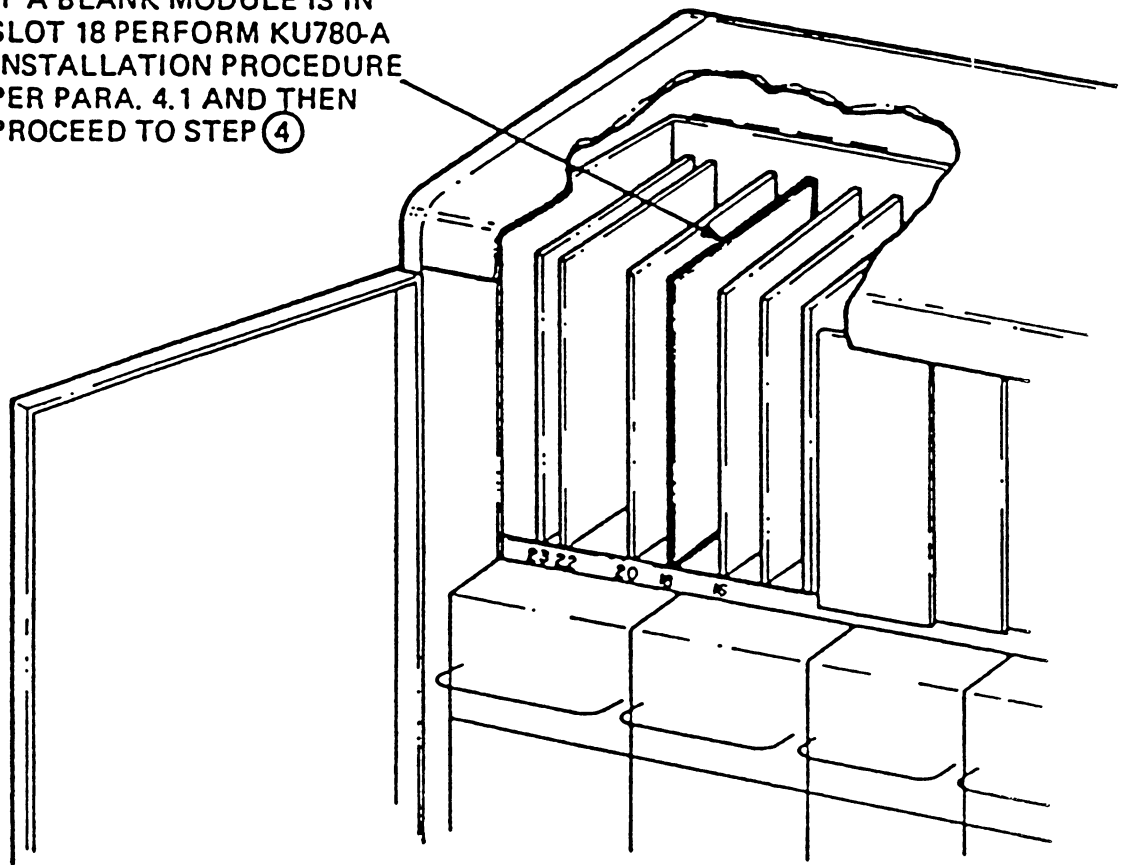


TK-1001G

Figure 4-5 KE780-A Installation Procedure  
(Sheet 1 of 4)

③ INSPECT SLOT 18 FOR PRESENCE  
OF AN M8238 MODULE:

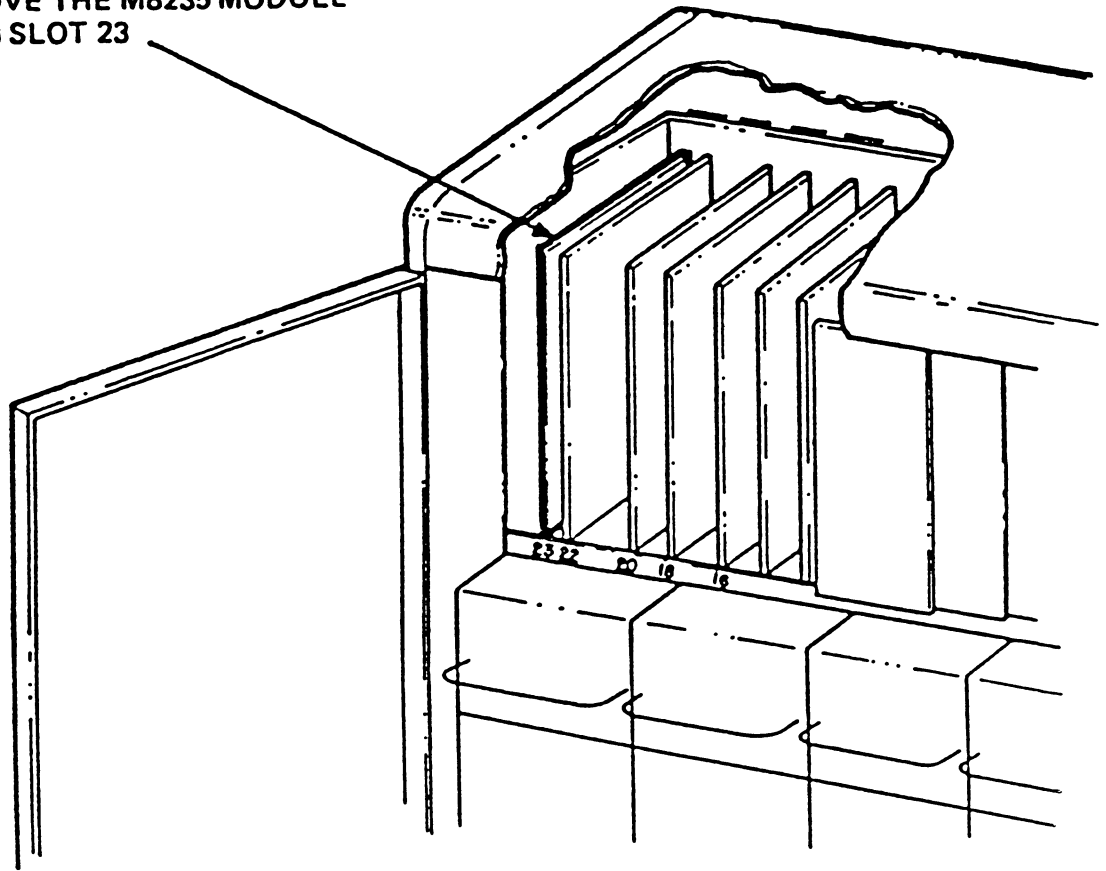
1. IF AN M8238 IS IN SLOT 18  
PROCEED TO STEP ④
2. IF A BLANK MODULE IS IN  
SLOT 18 PERFORM KU780-A  
INSTALLATION PROCEDURE  
PER PARA. 4.1 AND THEN  
PROCEED TO STEP ④



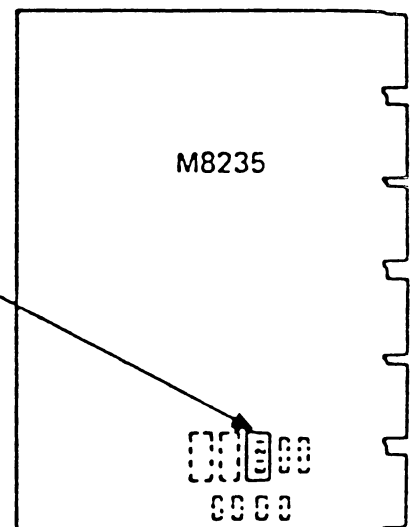
TK-10015

Figure 4-5 KE780-A Installation Procedure  
(Sheet 2 of 4)

- ④ REMOVE THE M8235 MODULE FROM SLOT 23



- ⑤ REMOVE FPLA E 121 CHIP (PART NO. 23-066C6-00) AND REPLACE WITH KE780-A FPLA CHIP (PART NO. 23-065C6-00)



- ⑥ REINSTALL M8235 MODULE IN SLOT 23

Figure 4-5 KE780-A Installation Procedure  
(Sheet 3 of 4)

TK-10014

- 7 AT FRONT OF CABINET UNIFORMLY REPOSITION AIR PANELS ALONG ENTIRE WIDTH OF CARD CAGE SLOT AREA
- 8 CLOSE CABINET DOORS
- 9 PERFORM KE780-A DIAGNOSTIC TESTS PER PARAGRAPH 4.3.2

Figure 4-5 KE780-A Installation Procedure  
(Sheet 4 of 4)



### 5.1 GENERAL

The VAX-11/780 UNIBUS adapter (UBA) DW780-AA/AB interfaces the CPU to the system units in the BA11-K expansion boxes. There can be a maximum of four UBAs (DW780s) installed in the VAX-11/780.

The DW780-CC/DD installation kit consists of:

- DW780-AA/AB card cage and backplane assembly
- H7100 power supply with H7101 .5V Regulator (P/N 7014956)
- Blank SBI slot panel
- Interconnecting cables
- Expansion cabinet DW780-AA/AB decal

#### CAUTION

The modules that comprise the DW780 contain components that could be damaged by electrostatic discharge. Do NOT

handle without the use of a VELOSTAT™\* Kit, CD Kit #A2-W0299-10, or other approved antistatic material. Install

the VELOSTAT™ kit per Chapter 3.

### 5.2 DW780 POWER SUPPLY INSTALLATION

#### 5.2.1 System Turn-Off

Turn off the system (Figure 4-1).

#### 5.2.2 H7100 Installation

Determine the need for the H7100 included in the option installation kit (Figure 5-1). If an H7100 is not required inform the customer of H7100 spare status and then proceed with the option installation procedure. If an H7100 is required remove the blank power supply panel. Install the H7100, using the mounting hardware and the slide lock (Figure 5-2).

### 5.3 SYSTEM FAR-END TERMINATOR (SFT) RELOCATION

1. Open the CPU cabinet back door and remove the six SBI jumper cables connecting the SFT to the unit mounted next to it.
2. Disconnect the cable harness plugs from SFT jacks J7, J8, and J9.

3. Remove and save the ten screws that hold the SFT to the blank panel and then remove the SFT.
4. Mount the SFT in the SBI expansion cabinet on a blank panel to the left of the 4-inch option slot where the DW780 is to be installed.
5. Secure the SFT to the blank panel using the ten screws saved in step 3.
6. Connect plugs P7, P8, and P9 from the cabinet cable harness to SFT jacks J7, J8, and J9.

#### 5.4 DW780-CC/DD INSTALLATION

1. Remove the 4-inch blank option panel in the SBI expansion cabinet where the DW780 is to be installed.
2. Replace the blank panel with the DW780-CC/DD and attach it at the top and bottom of the cabinet card cage using the four screws provided in the installation kit.
3. Install the paddle card (Figure 5-3) on the DW780 backplane.

#### 5.5 DW780 INTERCONNECTING CABLING

##### 5.5.1 H7100 Cabling

1. Interconnect the DW780 and the H7100 cabling (Figure 5-4).
2. Connect the H7100 primary power cable (Figure 5-5).
3. Route the power supply cable (Figure 5-6).

##### 5.5.2 SFT Cabling

Interconnect the SFT cables to DW780-CC/DD with six ribbon cables (Figure 5-7).

##### 5.5.3 DW780 Cabling

1. Interconnect DW780 with the last unit in the CPU cabinet via six 18-inch ribbon cables (Figure 5-7).
2. Install protective grommets in the six expansion cabinet-to-CPU wall holes (ribbon cable holes).
3. Install UNIBUS terminator card M9044 in DW780.

#### 5.6 DW780 JUMPER PLUGS

Install the DW780 jumper plugs (Figure 5-8).

### **5.7 DW780 DECAL**

Install DW780 decals in the CPU expansion cabinet.

### **5.8 SYSTEM TURN-ON**

Turn on the system (Figure 4-3) and run DW780 diagnostics.

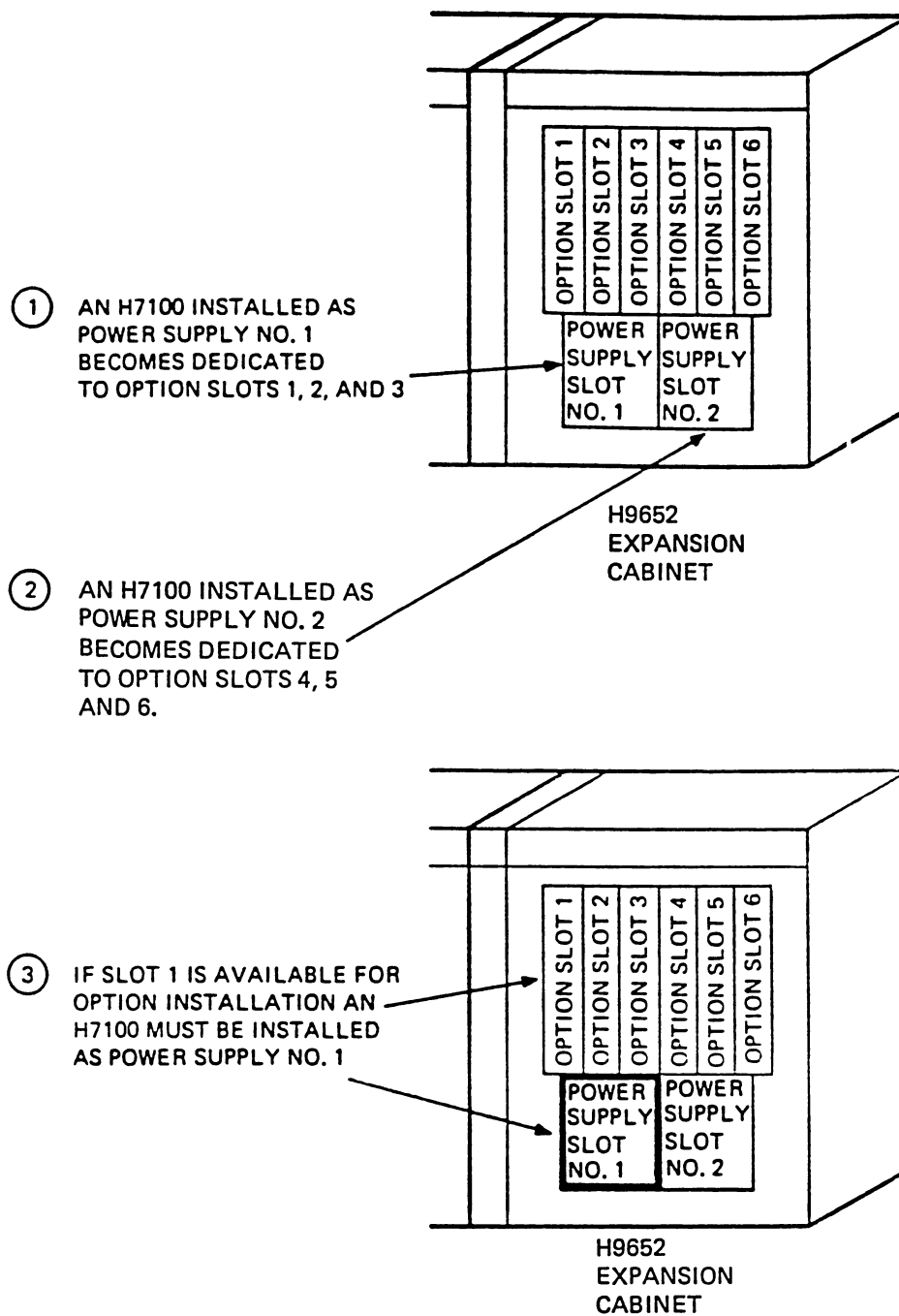
### **5.9 DW780 DIAGNOSTICS**

Run one pass with the following diagnostics:

1. ESKAH
2. ESKAJ
3. ESCBA
4. UETP

#### **NOTE**

Before running diagnostics for devices on the UNIBUS see EVNDX for appropriate diagnostics.



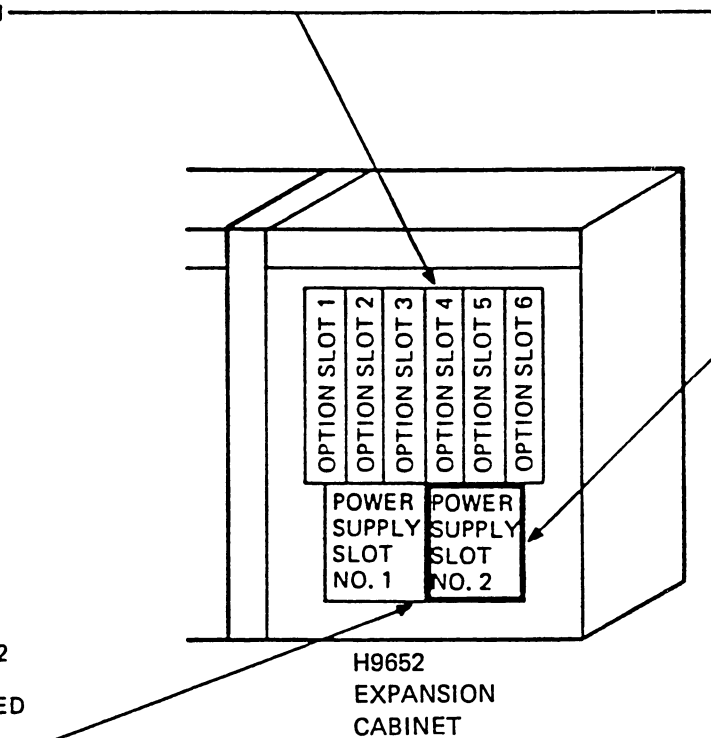
TK-7197

Figure 5-1 Power Supply Utilization (Sheet 1 of 2)

- ④ IF AN H7100 HAD BEEN PREVIOUSLY INSTALLED AS POWER SUPPLY NO. 1 FOR AN OPTION MOUNTED IN SLOT 1 (AND SLOTS 2 OR 3 ARE AVAILABLE FOR THE OPTION) THE H7100 IN THE OPTION INSTALLATION KIT IS NOT REQUIRED

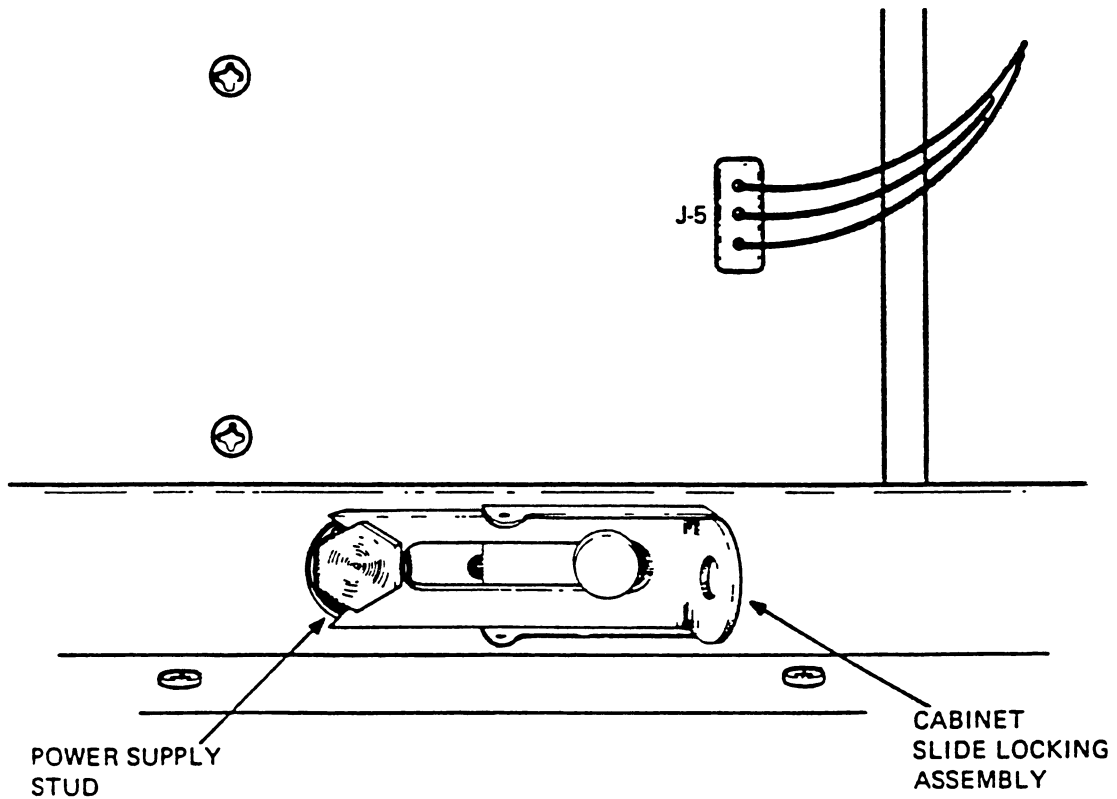
- ⑤ IF SLOT 4 IS AVAILABLE FOR OPTION INSTALLATION AN H7100 MUST BE INSTALLED (AS POWER SUPPLY NO. 2)

- ⑥ IF POWER SUPPLY NO. 2 HAD ALREADY BEEN PREVIOUSLY INSTALLED FOR AN OPTION IN SLOT 4 (OPTION WILL THEN BE MOUNTED IN SLOT 5) THE H7100 IN THE OPTION INSTALLATION KIT IS NOT REQUIRED



TK-7201

Figure 5-1 Power Supply Utilization (Sheet 2 of 2)



TK-7221

Figure 5-2 Power Supply Slidelock Details

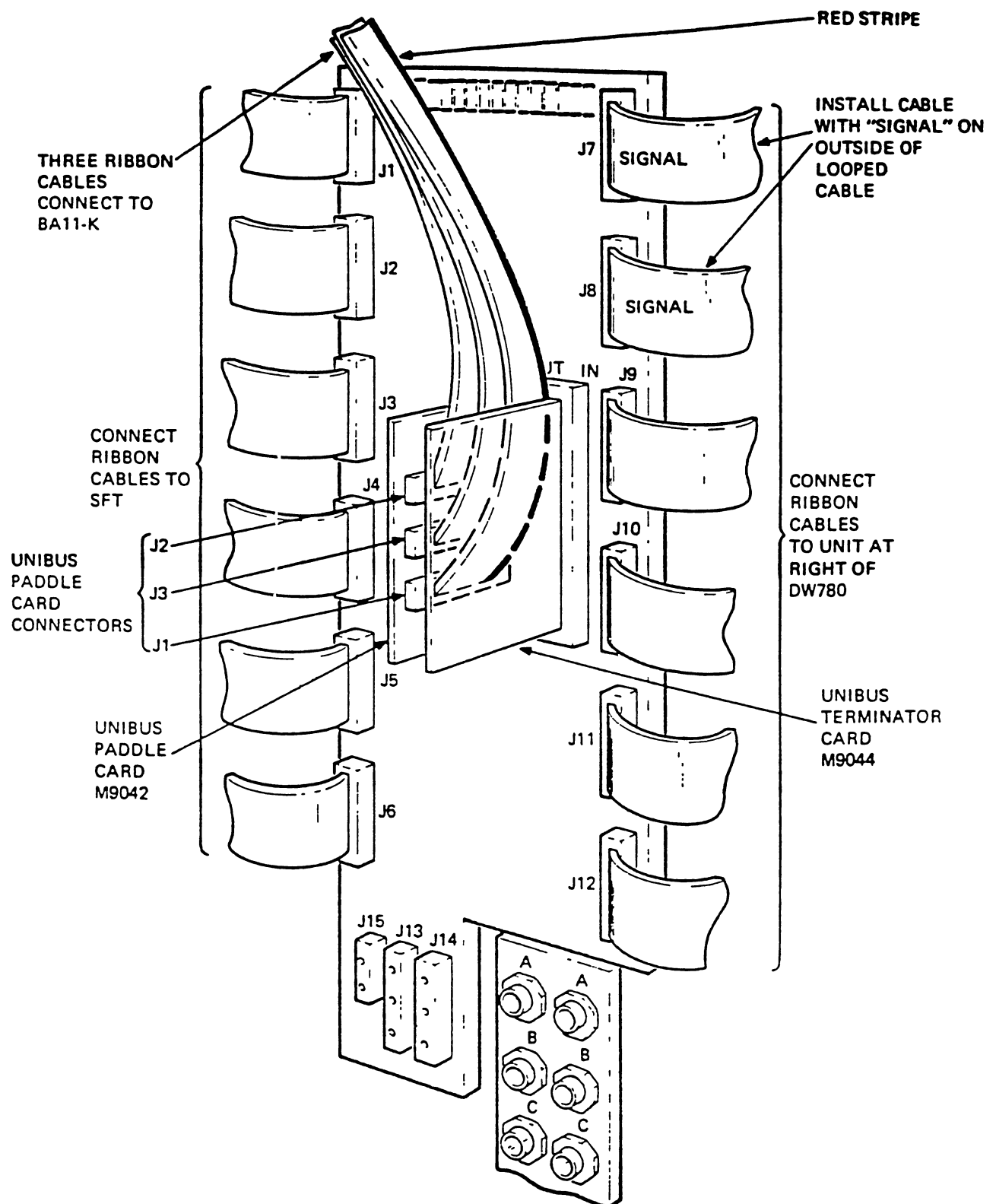
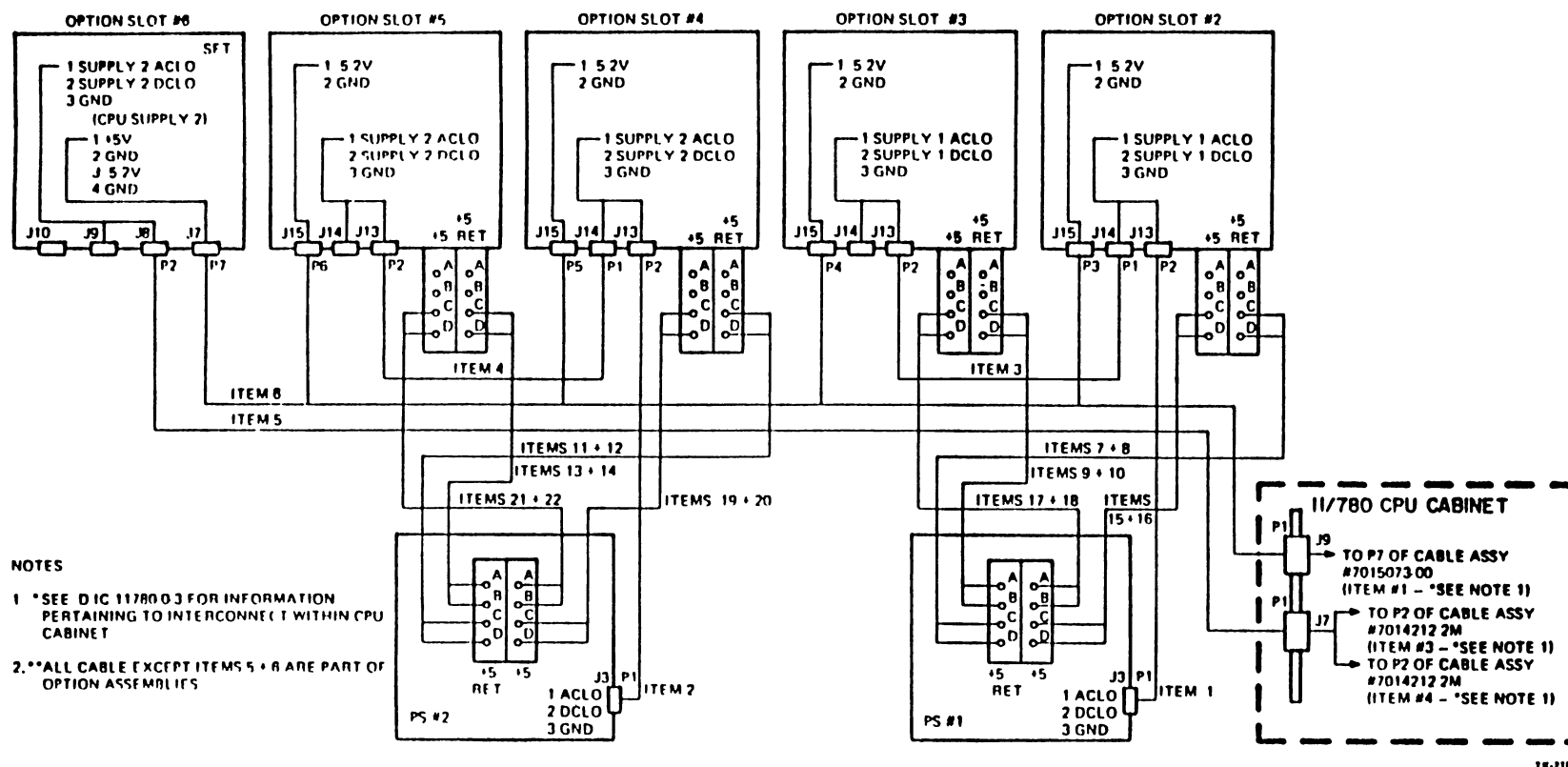


Figure 5-3 DW780 Installation Details

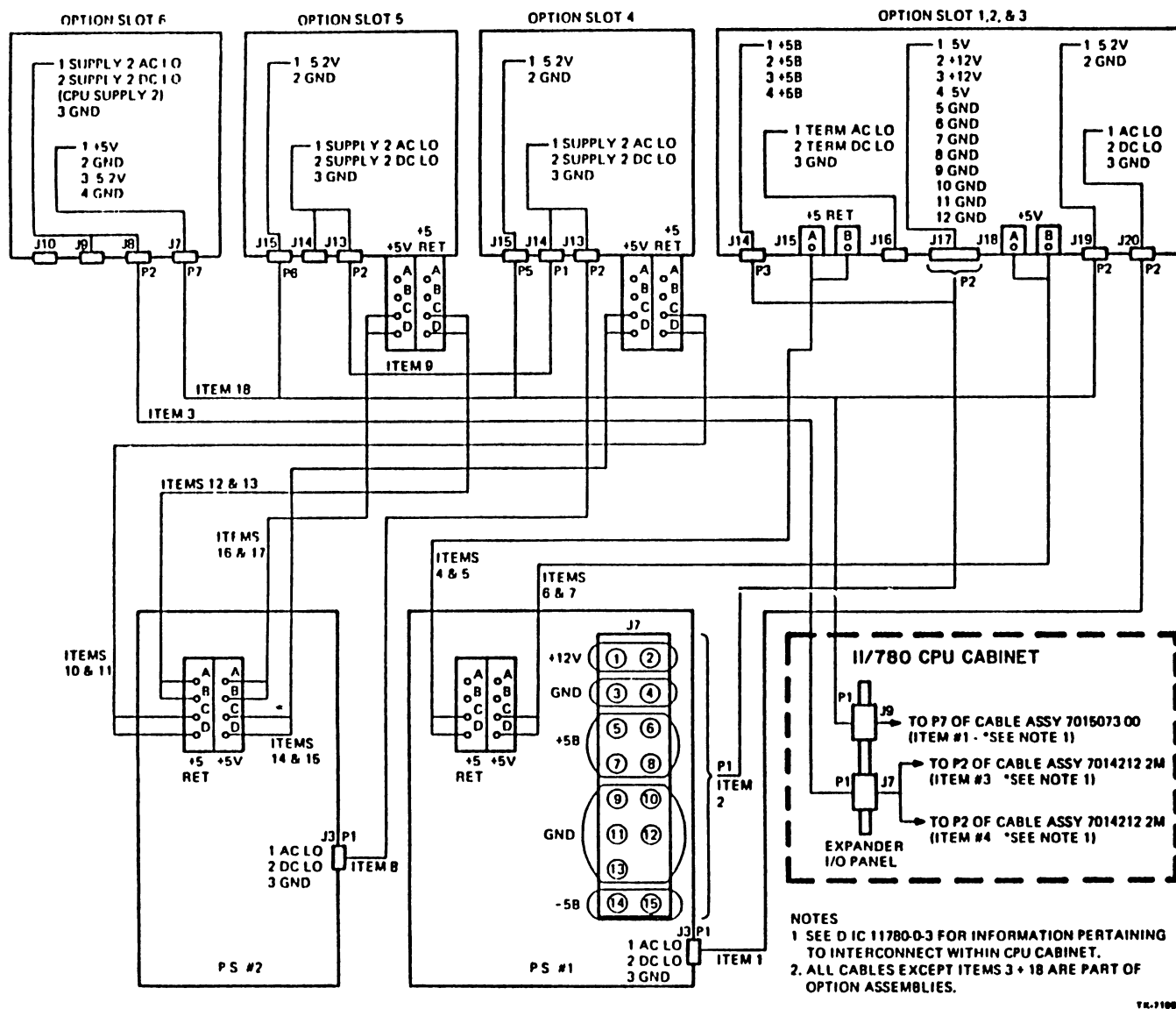
TK-7225



TG-7180

Figure 5-4 Option Power Supply Cabling (Sheet 1 of 3)





TR-7100

Figure 5-4 Option Power Supply Cabling (Sheet 2 of 3)

OPTION INTERCONNECT TABLE

ITEM # REF.	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7014212 0M	CABLE AC DC LO	CABLE P1	PS #1 J3	AC,DC LO + GND
			P2	SLOT 2 J13	
2	7014212 0M		P1	PS #2 J3	
			P2	SLOT 4 J13	
3	7014212 0H		P1	SLOT 2 J14	
			P2	SLOT 3 J13	
4	7014212 0H	CABLE AC,DC LO	P1	SLOT 4 J14	
			P2	SLOT 5 J13	
5*	7015632 06	CABLE TO TERM BD	P1	CPU I/O PANEL J7	
			CABLE P2	SLOT 6 J8	AC,DC LO + GND
6*	7015630 00	HARNESS TERM	HARNESS P1	CPU I/O PANEL J9	+5V,GND, 5V,GND
			P3	SLOT 2 J15	
			P4	SLOT 3 J15	
			P5	SLOT 4 J15	
			P6	SLOT 5 J15	
			HARNESS P7	SLOT 6 J7	+5V,GND, 5V,GND
7	7014249 0L	CABLE POWER (BLK)	PS #1 +5RET C	SLOT 2 +5RET C	PS #1 +5RETURN
8			D	SLOT 2 +5RET D	
9			A	SLOT 3 +5RET C	
10			PS #1 +5RET B	SLOT 3 +5RET D	PS #1 +5RETURN
11			PS #2 +5RET C	SLOT 4 +5RET C	PS #2 +5RETURN
12			D	SLOT 4 +5RET D	
13			A	SLOT 5 +5RET C	
14	7014249 0L	CABLE POWER (BLK)	PS #2 +5RET B	SLOT 5 +5RET D	PS #2 +5RETURN
15	7014530 0L	CABLE POWER (RED)	PS #1 +5V C	SLOT 2 +5V C	PS #1 +5V
16			D	SLOT 2 +5V D	
17			A	SLOT 3 +5V C	
18			PS #1 +5V B	SLOT 3 +5V D	PS #1 +5V
19			PS #2 +5V C	SLOT 4 +5V C	PS #2 +5V
20			D	SLOT 4 +5V D	
21			A	SLOT 5 +5V C	
22	7014530 0L	CABLE POWER (RED)	PS #2 +5V B	SLOT 5 +5V D	PS #2 +5V

## NOTE

\*ALL CABLES EXCEPT ITEMS 5 & 6 ARE PART OF  
OPTION ASSEMBLIES

OPTION INTERCONNECT TABLE

ITEM # REF.	PART NUMBER	DESCRIPTION	FROM	TO	REMARKS
1	7014212 1C	CABLE AC DC LO	CABLE P1	PS #1 J3	AC DC LO & GND
			P2	SLOT 1,2, & 3 - J20	
2	7014234 0K	CABLE +5BE + 12	P1	PS #1 - J7	+5B & +12
			P2	SLOT 1,2, & 3 - J17	
			P3	SLOT 1,2, & 3 - J14	
3*	7015632 06	CABLE TO TERM BD	P1	CPU I/O PANEL - J7	AC DC LO & GND
			CABLE P2	SLOT 6 - J8	
4	7014250 0K	CABLE POWER (BLK)	PS #1 +5 RET A	SLOT 1,2, & 3 - J15 A	PS #1 +5 RETURN
5			B	SLOT 1,2, & 3 - J15 B	
6	7014529 0K	CABLE POWER (RED)	A	SLOT 1,2, & 3 - J18 A	PS #1 +5V
7			PS #1 +5 RET B	SLOT 1,2, & 3 - J18 B	
8	7014212 0M	CABLE AC DC LO	CABLE P1	PS #2 - J3	AC DC LO & GND
	7014212 0M		P2	SLOT #4 - J13	
9	7014212 0H	CABLE AC DC LO	P1	SLOT #4 - J14	
			CABLE P2	SLOT #5 J13	AC DC LO & GND
10	7014249 0L	CABLE POWER (BLK)	PS #2 +5 RET C	SLOT #4 +5 RET C	PS #2 +5 RETURN
11			D	. D	
12	7014249 0L	CABLE POWER (BLK)	A	SLOT #5 +5 RET C	PS #2 +5 RETURN
13			PS #2 +5 RET B	. D	
14	7014530 0L	CABLE POWER (RED)	PS #2 +5V C	SLOT #4 +5 . C	PS #2 +5V
15			D	. D	
16	7014530 0L	CABLE POWER (RED)	A	SLOT #5 +5 . C	PS #2 +5V
17			PS #2 +5V B	. D	
18*	7015630 00	HARNESS TERM	HARNESS P1	CPU I/O PANEL - J9	+5V GND 5V GND
			P2	SLOTS 1,2, & 3 - J19	
			P5	SLOT 4 J15	
			P6	SLOT 5 J15	
			HARNESS P7	SLOT 6 J7	

## NOTE

\*ALL CABLES EXCEPT ITEMS 3 & 18 ARE PART OF  
OPTION ASSEMBLIES

Figure 5-4 Option Power Supply Cabling (Sheet 3 of 3)

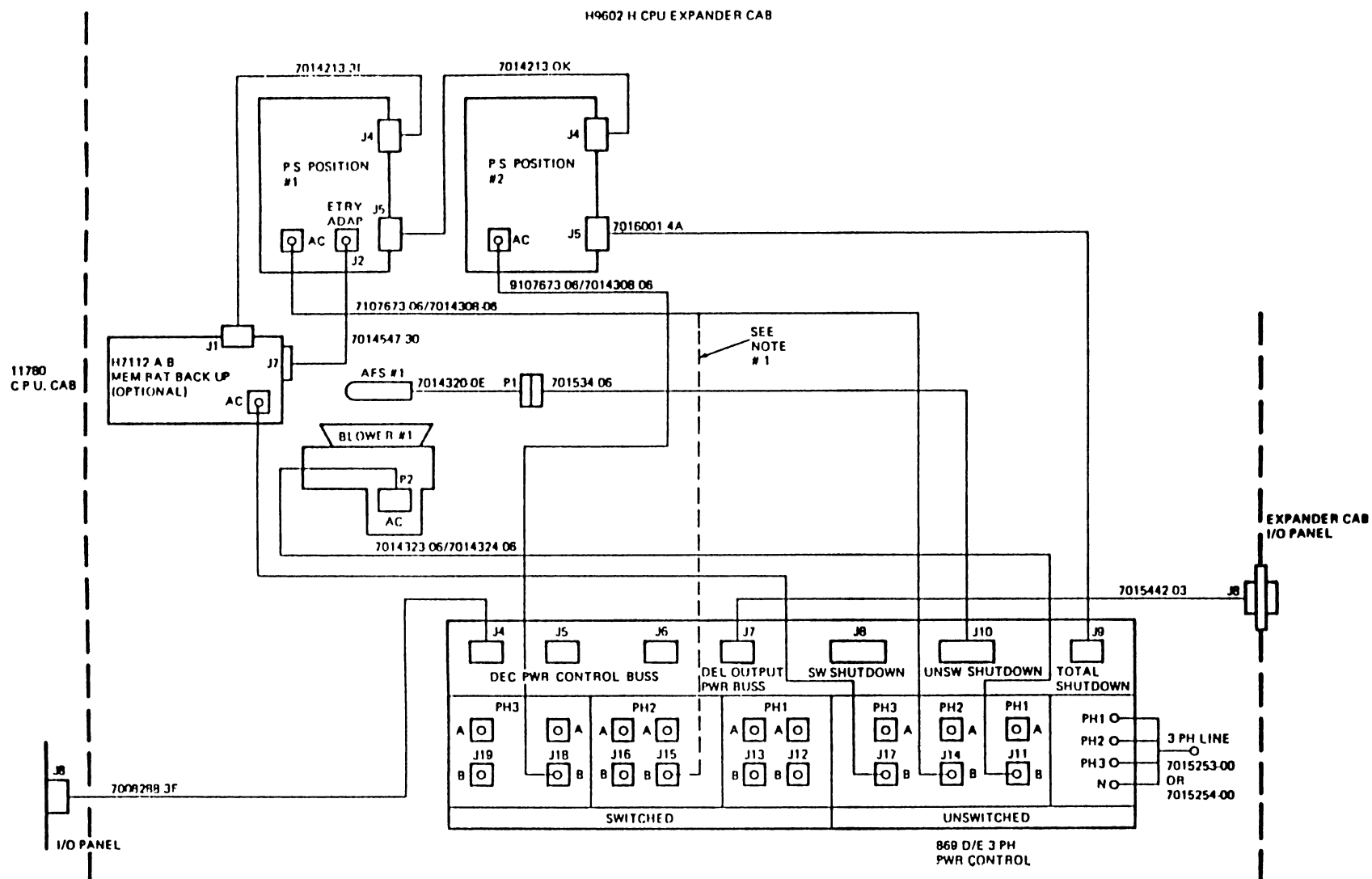
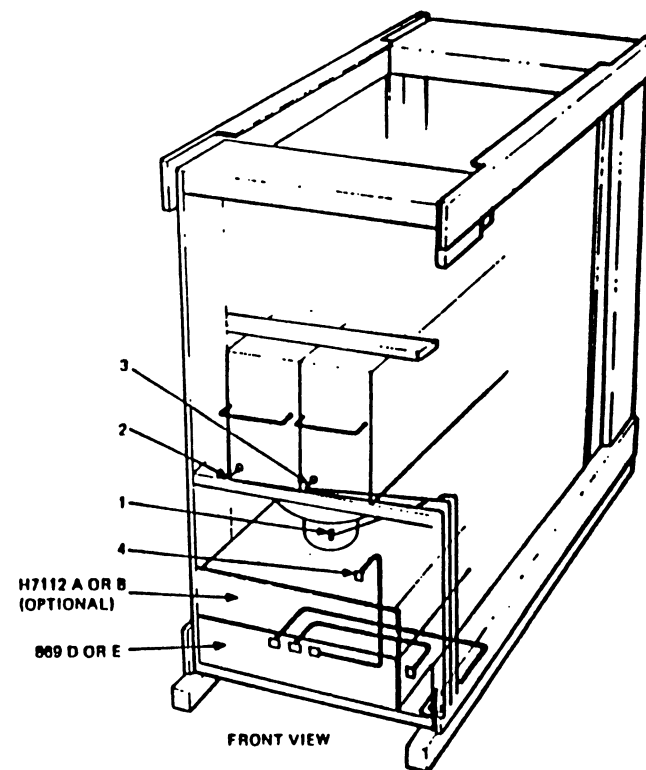
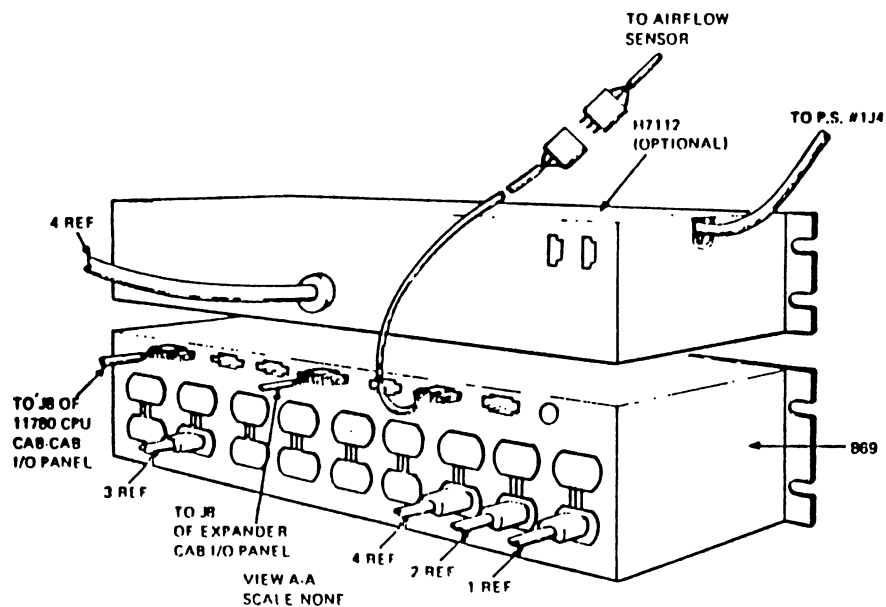


Figure 5-5 H7100 Primary Power Cabling

Figure 5-6 H7100 Primary Power Cable Routing

ITEM NO. (REF. ONLY)	115 VOLT A.C. 50/60 HZ SYSTEM			
	PART NO.	DESCRIPTION	FROM	TO
1	7014323 06	POWER CORD ASS'Y (FAN 115V)	CORD P1	MR D/J11-B
	7014323 06		CORD P2	BLOWER-J1
2	9107673 26	EXTENSION CORD 115V 6 FT.	CORD PLUG	869 D/J14-B
	9107673 26		CORD BACK	P.S. #1 A.C.
3	9107673 06	EXTENSION CORD 115V 6 FT.	CORD PLUG	869 D/J18-B
	9107673 06		CORD BACK	P.S. #2 A.C. *
OPTIONAL { 4	H7112 A	BATTERY CHARGER (115V, 60HZ)	A.C. CORD PLUG	869 D/J17-B

ITEM NO. (REF. ONLY)	230 VOLT A.C. 50/50 HZ SYSTEM			
	PART NO.	DESCRIPTION	FROM	TO
1	7014324 06	POWER CORD ASS'Y (FAN 230V)	CORD P1	869 E/J11-B
	7014324 06		CORD P2	BLOWER-J1
2	7014308 06	EXTENSION CORD 230V 6 FT.	CORD PLUG	869 E/J14-B
	7014308 06		CORD JACK	P.S. #1 A.C.
3	7014308 06	EXTENSION CORD 230V 6 FT.	CORD PLUG	869 E/J18-B
	7014308 06		CORD JACK	P.S. #2 A.C. *
OPTIONAL { 4	H7112 B	BATTERY CHARGER (230V 50 HZ)	A.C. CORD PLUG	869 E/J17-B



- NOTES: 1. SAMPLE ARRANGEMENT CONSISTS OF  
 A. 4 INCH BACKPLANE (QTY 4 OR SUBSET)  
 B. 3 INCH BACKPLANE (QTY 1)  
 C. SFT (#M9043)  
 2. S.B.I. CABLE CONNECTIONS TO S.F.T. FROM ADJACENT BACKPLANE ARE ALWAYS 1700087 01. OTHER S.B.I. CABLES ARE 1700087 00.  
 3. FOR S.B.I. IN & OUT SEE D IC 11780 0-3 SHEETS 2 & 3.  
 4. STANDARD CAB-CAB SBI CABLES ARE 1700087 03 (18") UNLESS CPU IS AN M780-CX THUS REQUIRING A 1700087-08 (24"). SEE SHEET #13 OF ARRANGEMENT DRAWINGS FOR CABLE CHART.  
 5. IF A 3 INCH BACKPLANE IS CONFIGURED, CAB-CAB CABLES PLUG INTO OPTION SLOT #1. OTHERWISE CAB-CAB SBI CABLES PLUG INTO SLOT #2.

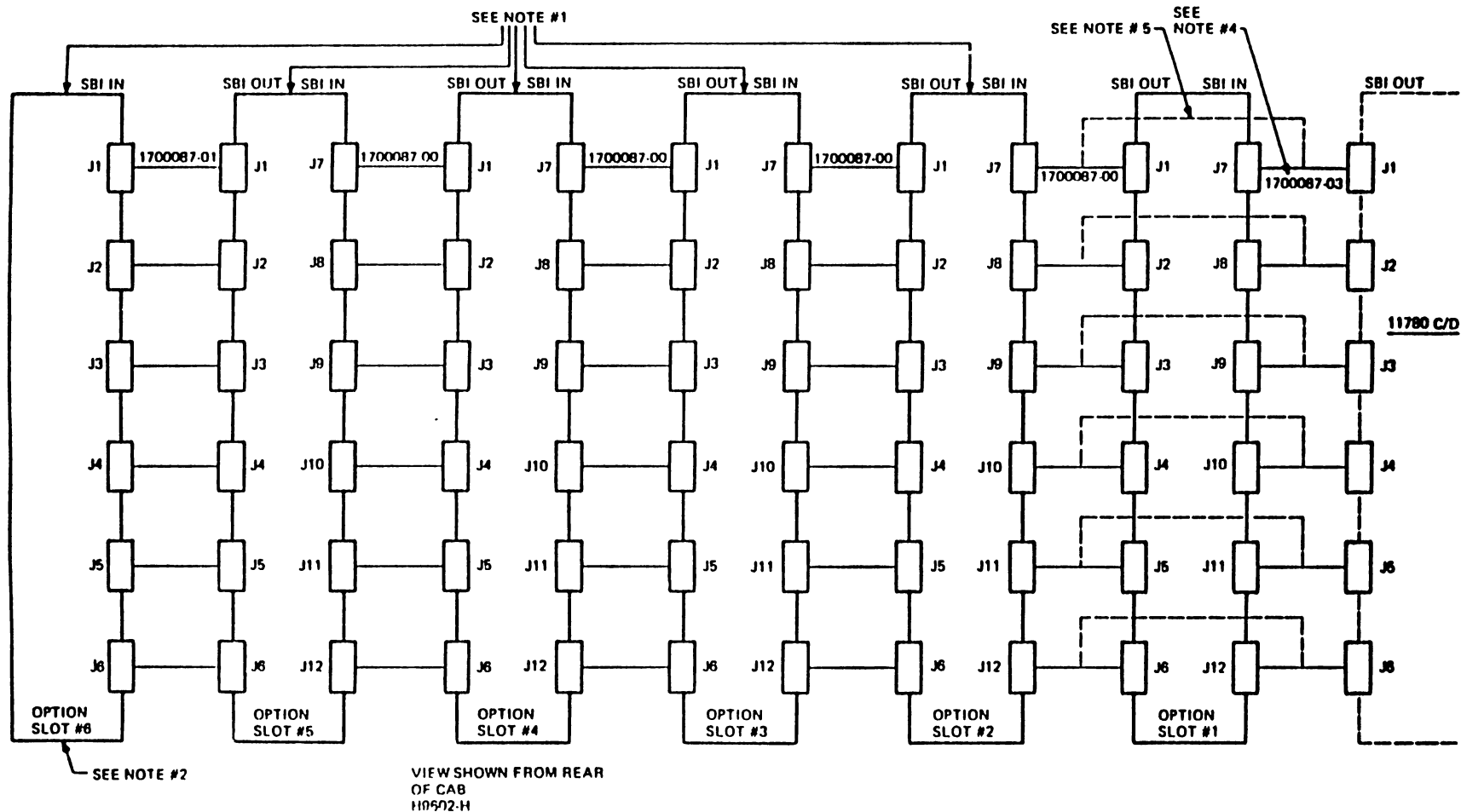


Figure 5-7 Ribbon Cable Interconnections

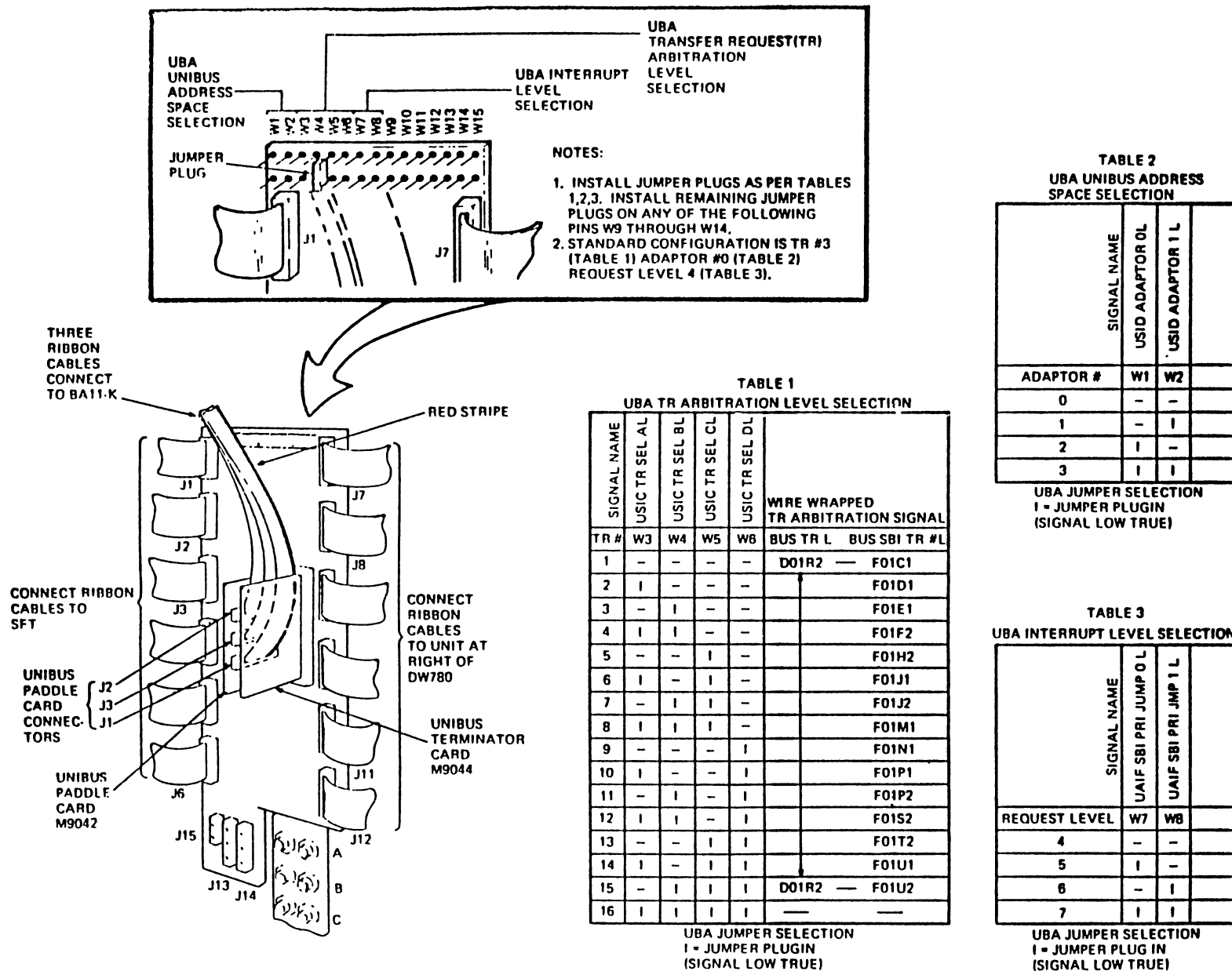


Figure 5-8 DW780 Jumper Plugs

### **6.1 GENERAL**

Installation of the DR780 consists of installing an H7100 power supply, the DR780 backplane assembly, and in some instances an SBI expander cabinet.

#### **CAUTION**

The modules that comprise the DR780 contain components that could be damaged by electrostatic discharge. Do NOT handle without the use of a Velostat Kit, CD Kit #A2-W0299-10, or other approved antistatic material. Install the Velostat kit per Chapter 3.

### **6.2 DR780 POWER SUPPLY INSTALLATION**

1. Turn off the system per Figure 4-1.
2. Remove the power supply blank cover from power supply mounting chassis and replace it with the H7100 power supply.
3. Secure the power supply at the back with the slide locking assembly.
4. Connect the two black cables (P/N 7014249-OL) to the return (ground) terminals on the power supply.
5. Connect the two red cables (P/N 7014530-OL) to the +5 volt terminals on the power supply.
6. Connect the ac/dc lo cable to the power supply (P/N 70-14212-OM).

#### **NOTE**

P1 connects to J3 on power supply.

7. Connect the overtemperature cable (P/N 7014213-OK) J4 at the back of the power supply.
8. Connect the power supply ac power cable to the power distribution box on the switched side (lower left) of the cabinet. Connect the female end of ac power cord to the front of the power supply.

### **6.3 SYSTEM FAR-END TERMINATOR (SFT) RELOCATION**

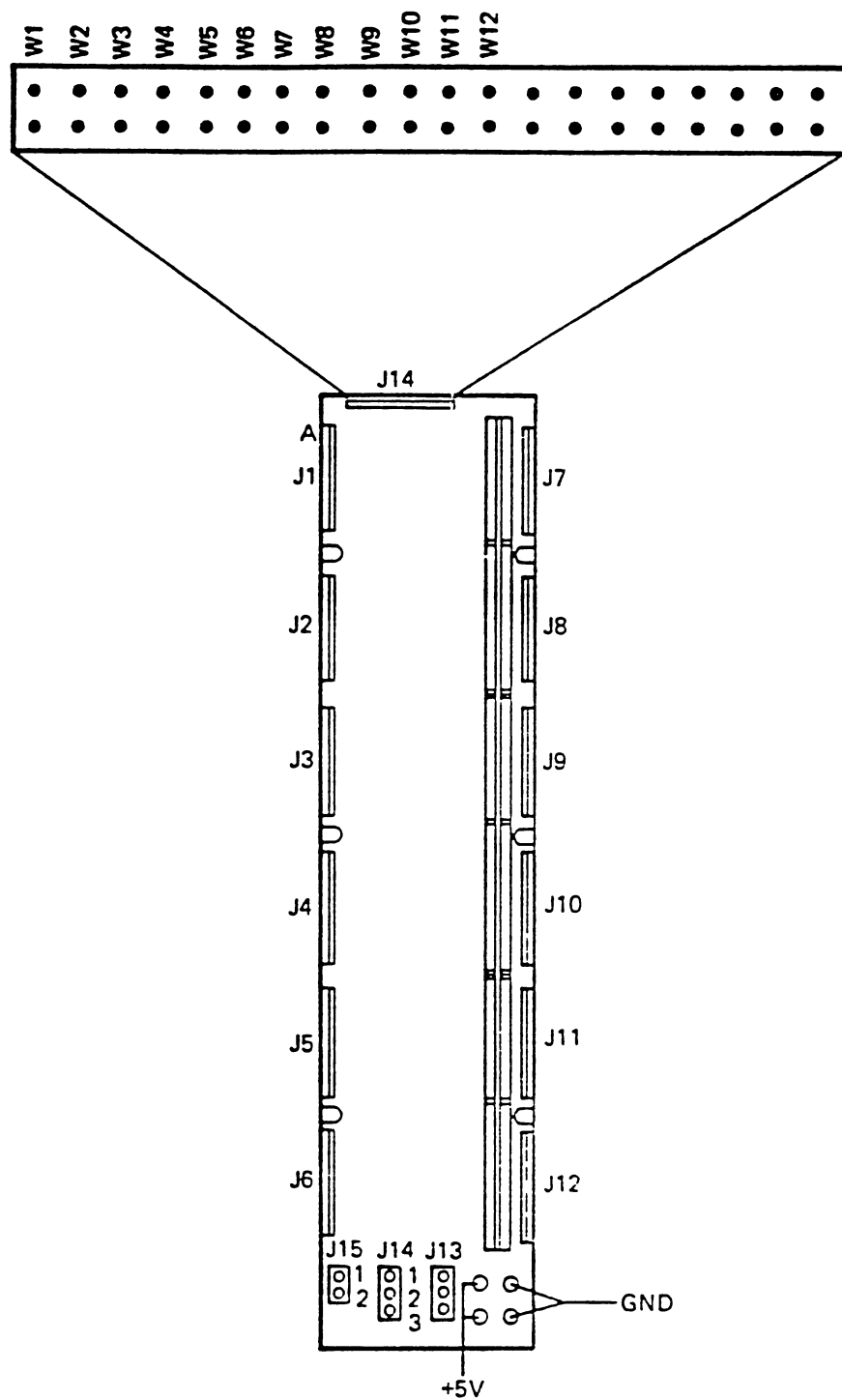
1. At the back of the cabinet remove and save the six SBI jumper cables (170087-01) connecting J1 through J6 of the SFT to J1 through J6 of the adjacent backplane to the 1 right of the SFT.

2. Disconnect the cable harness plugs from SFT jacks J7, J8, and J9.
3. Remove and save the ten screws that hold the SFT to the blank panel and then remove the SFT.
4. Mount the SFT on a blank panel to the left of the 4-inch option slot that will contain the DR780 backplane assembly.
5. Secure the SFT to the blank panel using the ten screws saved in step 3.

#### 6.4 DR780 BACKPLANE INSTALLATION

1. Remove the blank panel from the next available 4-inch option slot.
2. Install the DR780 backplane assembly (Figure 6-1) in the option slot using the mounting hardware supplied.
3. Install the following jumper wires on the DR780 backplane.
  - a. TR Level Jumper -- TR arbitration level jumpers for the first DR780 (W1, W2, and W4) are IN for a TR number of 12. TR arbitration level jumpers for the second DR780 (W4 and W3) are IN for a TR number of 13.
  - b. TR Wirewrap -- Wirewrap BUS SBI TRXX L for DR780 at TR12 from F02L2 to F02S2. Wirewrap BUS SBI TRXX L for the DR780 at TR13 from F02L2 to F02T2.
  - c. BR Level Jumpers -- Configure jumpers W5 and W6 for a BR of six (6); W5 IN, W6 OUT.
  - d. DI Clock Jumper Select -- If the DR780 is to be the clock source for the DI, then jumper W8 on back panel should be removed and stored on any backplane jumpered pins from W9 through W12 (these jumpers not used by the DR780). If the customer's device is to be the clock source for DDI, then install the jumper on pin W8.





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Figure 6-1 DR780 Backplane Details

- e. MSEL Jumper Select -- Install the jumper at W7 if the DR780 is not to perform DDI arbitration or be the master device. If the DR780 is to be the master device, the jumper should be installed on any pins from W9 through W12.

**NOTE**

In a DR780 interface to DR780 interface only one device should drive MSEL and supply the clock.

- f. Disable Wirewrap Selection -- There are two signals, disable A to B and disable B to A. If the DR780 is device A, then wirewrap E03R1 to E03T2 and E03R2 to E03F2. If the DR780 is device B, then wirewrap E03R1 to E03F2 and E03R2 to E03T2.
- 4. Connect the ac/dc lo cable (7014212-0M) P2 to connector J14 of the DR780 backplane.
  - 5. Install the two black power supply ground cables (7014530-0L) from the power supply ground to the left terminals of the power connectors which are on the backplane of the DR780.
  - 6. Install the two red power supply +5 volt cables (7014249-0L) to the right terminals of the power connectors which are on the back panel of the DR780.
  - 7. Install plug P3 of the --5 volt cable (7015630-00) to connector J15 of the DR780 backpanel.
  - 8. Install six SBI jumper cables from J7 through J12 on the DR780 backplane to J1 through J6 on the adjacent backplane to the right of the DR780.
    - a. Use 4-inch jumper cables (1700087-00) if both backplanes are mounted in the same cabinet and are immediately adjacent to one another.
    - b. Use 18-inch jumper cables (1700087-03) if the DR780 is the first assembly mounted in an SBI expander cabinet.

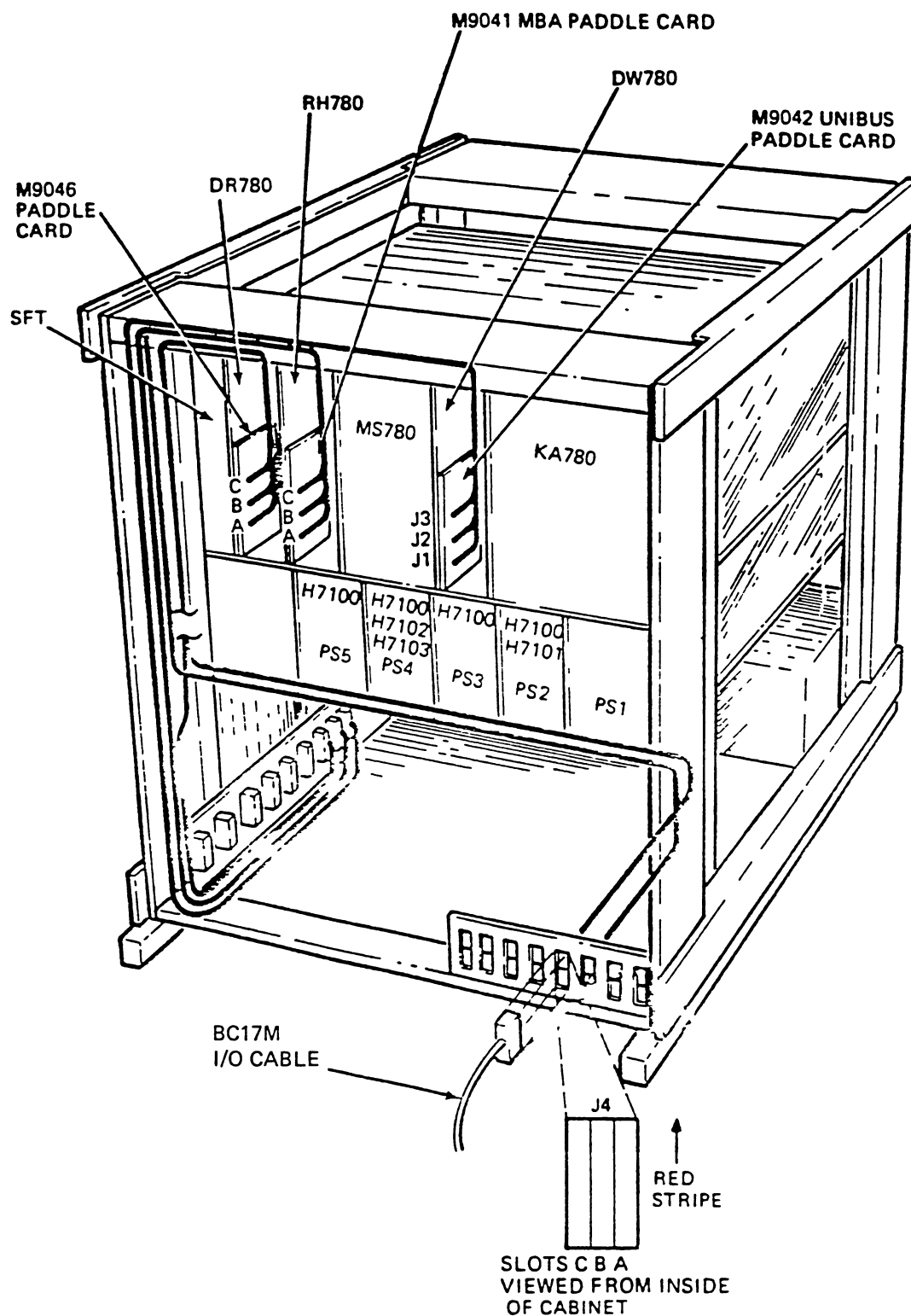
**NOTE**

Always connect SBI jumper cables with the "SIGNAL" label on the outside of the loop.

9. Install the DR780 paddle card (M9046-0-0) to the connector slot on the back panel of the DR780. This card should mount into the connector with the 40-pin connectors facing the right side of the cabinet.
10. Connect the three ribbon cables (BC06R-10) to the DR780 paddle card connectors A, B, and C (Figures 6-2 and 6-3).
  - a. Label the cables appropriately before installing them. Be sure that the red stripe on the cable faces the DR780 backplane.
    - 1) Cable BC06R-10 connects to the I/O connector panel in the back of the cabinet.
    - 2) Cable BC06R-25 connects the DR780 to customer's interface in a UNIBUS or magtape cabinet from the CPU I/O panel.
  - b. Route the BC06R-10 cables up toward the top of the card cage and to the left side of the cabinet.
  - c. Route the cables down the left side of the cabinet to:
    - 1) The cable trough located above the power supply chassis, then to right side of the system, if the cable is to connect to CPU I/O panel.
    - 2) Cabinet-to-cabinet I/O panel if the DR780 is to interface with the customer's interface in the adjacent cabinet.
  - d. Connect the opposite ends of the three BC06R-10 cables.
    - 1) To the I/O cable connector
 

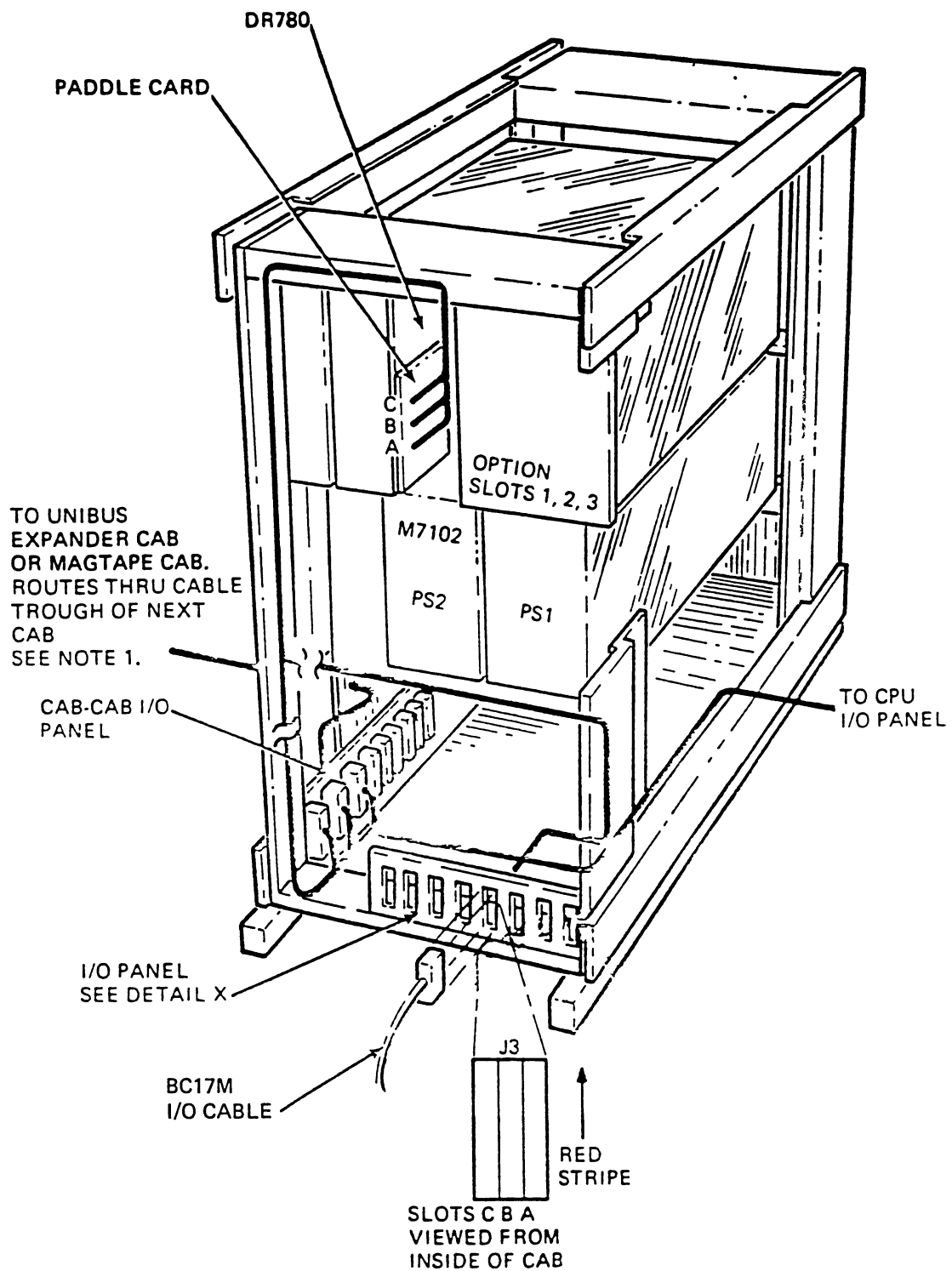
Cable Connector	I/O Cable Connector Slot
A	A
B	B
C	C
    - 2) To the cabinet-to-cabinet I/O panel
 

Cable Connector	I/O Expander Panel Connector
A	J9
B	J8
C	J7



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Figure 6-2 DR780 Cable Route to CPU Cabinet



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Figure 6-3 DR780 Cable Route in SBI Expansion Cabinet

- e. If the DR780 is connected to an external cabinet away from the VAX system, install the I/O connector to the CPU I/O panel located at the back of the cabinet. The I/O cable connector (7013678-00) is fastened to the I/O cable connector panel with four screws and nuts. The I/O cable connector goes into slot J3 for the SBI expander cabinet and into slot J4 of main CPU cabinet. The red stripe on each cable should face up from the bottom of the cabinet.

11. Connect the large BC06V I/O cable from slot J3 on SBI expander cabinet, or slot J3 or J4 from the main CPU cabinet to the customer's connector.

#### 6.5 DR780 DIAGNOSTICS

To test a DR780 which is not configured as a two-DR780 two-CPU link, perform the following:

1. Disconnect the DR780 from the BDI by pulling the paddle card and removing the BC06V-25 cable.
2. Connect a jumper from DR780 backplane pin E04M1 in pin E04R1.
3. Connect a jumper from DR780 backplane pin E04M2 to pin E04R2.
4. Remove W7 and W8 from the DR780 backplane.
5. Turn on the system (Figure 4-3).
6. Initialize and unjam the SBI via the console commands:  
  
INIT  
UNJAM
7. Load the diagnostic supervisor ESSAA.EXE using the command BOOT or LOAD ESSAA.EXE/ST:FE00 (from the diskette) or RUN ESSAA (for user mode diagnostic).
8. Insert one of the two DR780 diagnostic diskettes into the drive.
9. Load the desired diagnostic program by its designation letters using the command LOAD.  
  
"LOAD ESDF?" where ?=A, B, C (on diskette #1)  
or  
"LOAD EVDF?" where ?=D (on diskette #2)
10. Attach the device to be tested using the command ATTACH. Check the individual diagnostic listing for a complete list.

ESDFA -- This is a standalone diagnostic package that uses its own microcode to test all DR780 registers, the data path, and the DUP microsequencer.

ESDFB -- This is a standalone diagnostic package that uses its own microcode to test the functions of the DR780 Control Board (DCB) and DR780 microprocessor board (DUP).

ESDFC -- This is a standalone diagnostic package that uses its own microcode to test all functions used by the DR780 silo module (DSM), and the out of sequence logic on the DR780, located on the DSC and DCB.

ESDFD -- This program exercises the DR780 with the standard DR780 microcode. It is a standalone diagnostic package that checks the correct functioning of the DR780 by performing actual data transfers with different block sizes, and in different error and nonerror modes. The exercising of the DR780 is performed with all command types, with and without data chaining. ESDFD loads a copy of WCS file into the DR780 so it can be used to run the ESDFE error program.

ESDFE -- This diagnostic package is a standalone diagnostic used to test the CPU-to-CPU function of the DR780 by using two DR780s. ESDFE cannot be operated if the microcode has not been loaded.

ESDFE -- This diagnostic package is similar to ESDFD, but it tests the DR780 in user mode.

ESDFG -- This package is similar to ESDFE, but it tests the DR780 in user mode.

## 6.6 LOADING THE DR780 MICROCODE

Use the following procedure to load the DR780 microcode from the diskette.

### NOTE

The microcode must be loaded into the DR780 each time the DR780 is power enabled.

1. Log in as the system manager by getting the customer to log on.

2. Once the system is available for use under the system manager, type:

```
$ SET DEFAULT [SYSUPD]
```

3. Load the DR780 microcode diskette in the disk unit, type:

```
$ @VMSUPDATE
```

4. Answer the question asked by the system.

5. Remove the diskette from the disk unit, type:

```
$ RUN SYS$SYSTEM:XFLOADER
```

This loads the DR780 microcode into the WCS RAM of the DR780.

It is recommended that the above command be put into the system startup file.

#### 6.7 USING UETP TO TEST DR780

The following must be done in order to use the User Environment Test Package (UETP).

1. The DDI cable must be disconnected from the DR780 to be tested. If this cable is BC06V-\*, it is located at the bottom of the back of the cabinet that holds the DR780. If this cable is BC06B-R, then the paddle card should be removed from the backplane and the appropriate jumpers installed (see step 3).
2. The file XF780.ULD (DR780 microcode file) must exist in SYS\$SYSTEM:. It must be copied to the system disk from the diagnostic media.
3. With the DR780 power removed the following backplane jumper changes must be made.
  - a. Remove the jumpers from W7 and W8 (at the top of the backplane).
  - b. Add the jumpers from E04M1 to E04R1.
  - c. Add the jumpers from E04M2 to E04R2.
  - d. Refer to UETP User's Guide (AA-D643A-TE) for startup of the UETP.



## 7.1 GENERAL

The MASSBUS adapter (MBA) RH780 is the hardware interface between the SBI and high speed MASSBUS storage devices. The MBA installation kit includes:

- ^ RH780 card cage and backplane assembly
- ^ H7100 power supply
- ^ Blank SBI slot panel
- ^ Interconnecting cables
- ^ Expansion cabinet RH780 decal

### CAUTION

The modules that comprise the RH780 contain components that could be damaged by electrostatic discharge. Do NOT

handle without the use of a VELOSTAT<sup>TM</sup> Kit, CD Kit #A2-W0299-10, or other approved antistatic material. Install

the VELOSTAT<sup>TM</sup> kit per Chapter 3.

## 7.2 RH780 POWER SUPPLY (H7100) INSTALLATION

Turn off the system (Figure 4-1). Determine the use of H7100 included in the option installation kit (Figure 5-1). If an H7100 is not required inform the customer of H7100 spare status then proceed with the option installation procedure. If an H7100 is required, remove the blank power supply panel. Install the H7100 with the mounting hardware and the slide lock (Figure 5-2).

## 7.3 SYSTEM FAR-END TERMINATOR RELOCATION

### 7.3.1 SFT Removal

1. Open the back door of the CPU cabinet and remove the six SBI jumper cables connecting the SFT to the unit mounted to the right of the SFT.
2. Disconnect the cable harness plugs from SFT jacks J7, J8, and J9.
3. Remove and save the two screws that hold the SFT to the blank panel.
4. Mount the SFT in the SBI expansion cabinet on a blank panel to the left of the 4-inch option slot where the DW780 is to be installed.

5. Secure the SFT to the blank panel using the ten screws saved in step 3.
6. Connect plugs P7, P8, and P9 from the cabinet harness to SFT jacks J7, J8, and J9.

#### 7.4 RH780 INSTALLATION

1. Remove the two screws holding the blank option panels in the CPU expansion cabinet (where the RH780 will be installed) then remove the two panels.
2. Install the RH780 attaching it to the top and bottom of the cabinet card cage with the four screws provided in the installation kit.
3. Install the RH780 paddle card (Figure 7-1).

#### 7.5 RH780 INTERCONNECTING CABLE

##### 7.5.1 H7100 Cabling

1. Interconnect the RH780 and the H7100 (Figure 5-4).
2. Connect the primary H7100 power cable (Figure 5-5).
3. Route the power supply wiring (Figure 5-6).

##### 7.5.2 SFT Cabling

Interconnect the SBI cables to RH780 with the six ribbon cables (Figure 5-7).

##### 7.5.3 RH780 Cabling

If the RH780 is the last NEXUS in the CPU cabinet and a H9602-HA (SBI expander cabinet) is present, connect the two cabinets via six 18-inch ribbon cables (Figure 5-7).

#### 7.6 RH780 JUMPER PLUGS

Install the jumper plugs (Figure 7-2).

1. Select TR8-11 via a jumper plug.
2. Select BR level 5 via a jumper plug.

#### 7.7 SYSTEM TURN-ON

Turn on the system (Figure 4-3) then perform RH780 diagnostics.

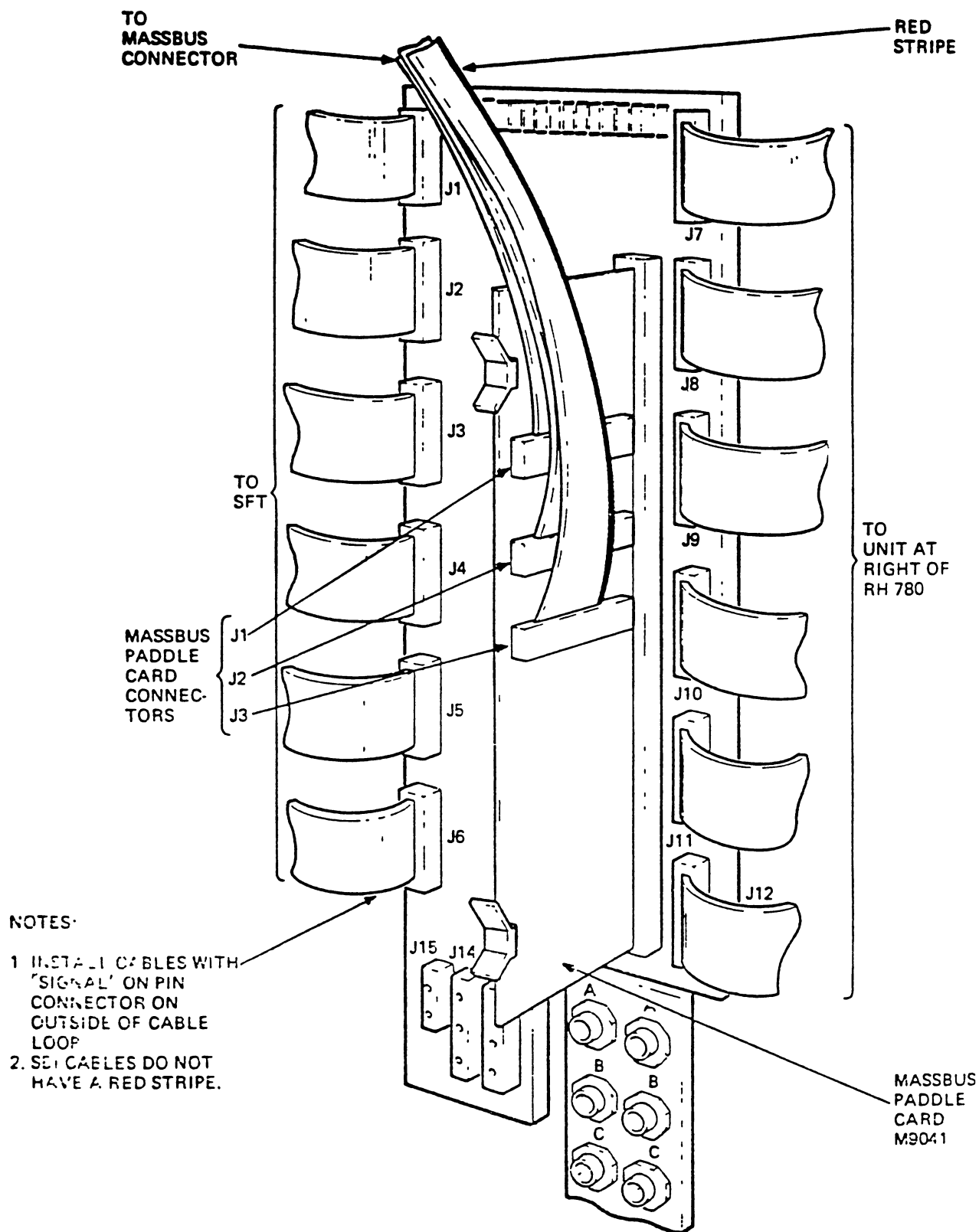
## 7.8 RH780 DIAGNOSTICS

Run one pass each with the following diskettes:

1. ESKAH
2. ESKAJ
3. ESKAA

### NOTE

Run diagnostics for devices attached to the MASSBUS. See EVNDX for appropriate diag-4 UETP.



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Figure 7-1 RH780 Installation Details

**Figure 7-2 Transfer Request Arbitration, Interrupt Level Details**

BLANK

### 8.1 MS780-C/D

MOS memory assembly MS780-C/D is a 512 Kbyte ECC MOS, 16K chip memory with a controller. It is installed in an H9652-HA/HB expansion cabinet. The MS780-C/D installation kit includes:

1. MS780-C/D card cage and modules
2. H7100 power supply (PN 70-14957)
3. Blank SBI slot panel
4. Interconnecting cables
5. Expansion cabinet MS780-C/D decal

#### NOTE

The Part I, Chapter 3 static discharge system set-up procedure must be performed during unpacking and inspection to prevent damage to the MS780-C/D from static electricity discharges.

#### 8.1.1 MS780-C/D Power Supply Installation

1. Turn off the system per Figure 4-1.
2. Remove the blank power supply panel.
3. Install the H7100, using the mounting hardware and the slide lock (Figure 5-2).

#### 8.1.2 System Far-End Terminator (SFT) Relocation

1. Open the CPU cabinet back door and remove the six SBI cables interconnecting the SFT and the adjacent unit.
2. Disconnect the power plugs from SFT jacks J7, J8, and J9.
3. Remove the SFT mounting hardware and carefully remove the SFT from the back of the CPU cabinet.
4. Replace the SFT with a blank SFT slot panel, using the screws provided in the installation kit.
5. Install the SFT in the back of the CPU expansion cabinet to the left of the space for the DW780 installation.
6. Attach the SFT to the top and bottom of the CPU expansion cabinet card cage, using the screws removed from the CPU cabinet.

### 8.1.3 MS780-C/D Card Cage Assembly Installation

1. Remove the four blank option panels (to the right of the SFT) in the CPU expansion cabinet where the MS780 C/D card cage assembly will be installed.
2. Install the MS780-C/D card cage assembly.

### 8.1.4 Interconnecting Cabling

1. Perform H7100 cabling per Figures 5-4 through 5-6.
2. Interconnect the SFT and the MS780-C/D via six ribbon cables per Figure 5-7.
3. Interconnect the MS780-C/D with the last unit in the CPU cabinet via six 18-inch ribbon cables per Figure 5-7 and 8-1.
4. Secure the intercabinet cabling with the tie wraps.

### 8.1.5 Starting Address, Transfer Request Strapping

Install starting address and transfer request strapping per Figure 8-2.

### 8.1.6 Fail Strapping, IRD Jumper

Install fail strapping and the IRD jumper per Figure 8-3, MS780-E installation procedure.

### 8.1.7 Decals

Install MS780-C/D decals in the CPU expansion cabinet.

### 8.1.8 MS780-C/D Diagnostics

Run the following diagnostics:

1. ESKAH (microdiagnostic no. 1)
2. ESKAJ (microdiagnostic no. 2)
3. UETP

#### NOTE

Part I, Chapter 2 describes how to run diagnostics.

## 8.2 MOS MEMORY ASSEMBLY MS780-EC/ED

The MS780-EC (120V, 60 Hz) and the MS780-ED (240V, 50Hz) are 2-Mbyte memory assemblies that are installed in a CPU cabinet or an expander cabinet. The unused modules slots in the MS780-EC/ED 11-inch backplane can be completely populated with MS780-F memory assemblies to produce a 16-Mbyte MS780-E.

An MS780-EC/ED installation kit includes:

1. 11-inch Card cage/20-slot backplane assembly
2. H7100 power supply (PN 70-14957)



3. AC DC LO cable
4. Black power return cable
5. Over-temperature cable
6. +5B cable
7. Two M8373 1-Mbyte memory modules
8. Two M8375 memory controller modules
9. M8376 SBI interface module
10. Blank modules
11. AWT revision status decal

Table 8-1 lists the Mbyte size of MS780-F memory assemblies used to expand an MS780-EC/ED.

Table 8-1 MS780-F Memory Assemblies - Mbyte Sizes

Memory Assembly	Size	No. of M8373 Modules
MS780-FA	2 Mbyte	2
MS780-FB	4 Mbyte	4
MS780-FC	6 Mbyte	6
MS780-FD	1 Mbyte	1
MS780-FF	10 Mbyte	10

#### 8.2.1 MS780-EC/ED Installation

Install the MS780-E per Figure 8-3.

##### NOTE

The Part I, Chapter 3 static discharge system procedure must be performed during unpacking and inspection to prevent damage to the MS780-EC/ED from static electricity discharges.

#### 8.2.2 MS780-E Diagnostics

##### NOTE

Part I, Chapter 2 describes how to run diagnostics.

1. Turn on the system per Figure 4-3 and run micro-diagnostics
2. Boot VMS
3. Run UETP

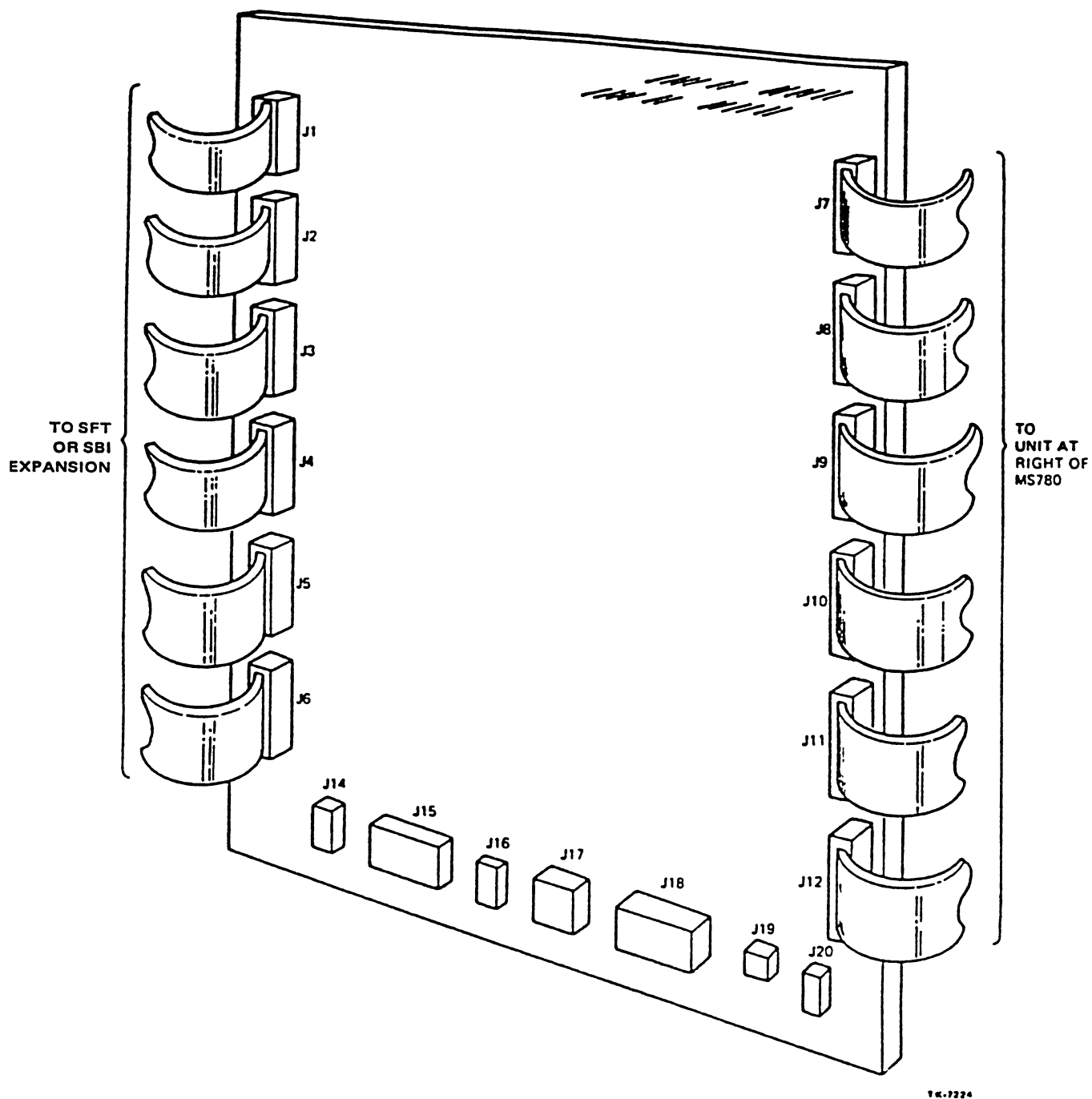
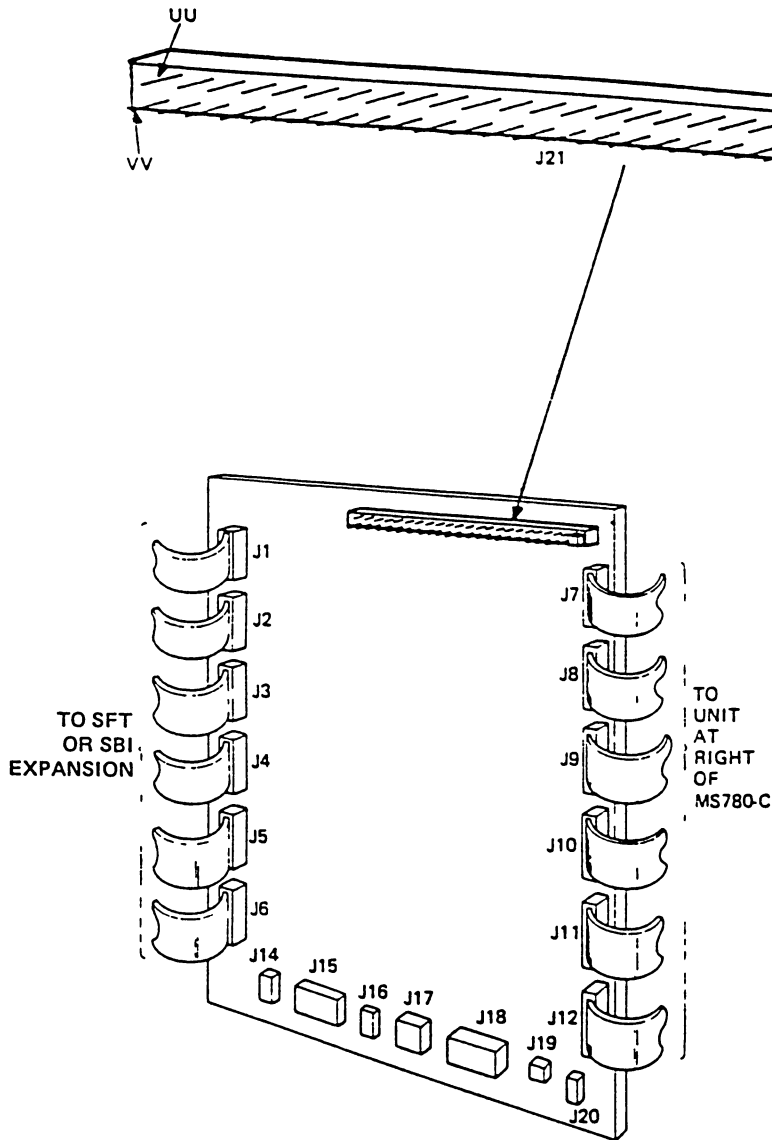


Figure 8-1 MS780-C/D Installation Details

# NOTE

INSTALL FAIL STRAPPING, IRD JUMPER PER  
FIGURE 8-3 OF THE MS780-E INSTALLATION  
PROCEDURE.



## NOTE:

1 = JUMPER PLACED ACROSS PAIR OF PINS  
DESIGNATED.

- = NO JUMPER.

## STARTING ADDRESS STRAPPING

J21-UU	J21-SS	MEMORY CONTROLLER STARTING ADDRESS AFTER COLD POWER UP ONLY
-	-	0 MEGA BYTE
-	1	4 MEGA BYTE
1	-	8 MEGA BYTE
1	1	12 MEGA BYTE

## TR LEVEL STRAPPING

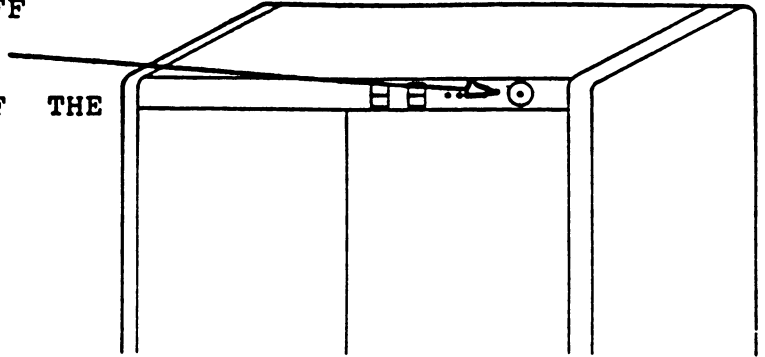
J21-H	J21-E	J21-C	J21-A	BACKPLANE WIRE F20K2 TO ---	BUS TR LEVEL
-	-	-	-	F20C1	1
-	-	-	1	F20D1	2
-	-	1	-	F20E1	3
-	-	1	1	F20F2	4
-	1	-	-	F20H2	5
-	1	-	1	F20J1	6
-	1	1	-	F20J2	7
-	1	1	1	F20M1	8
1	-	-	-	F20N1	9
1	-	-	1	F20P1	10
1	-	1	-	F20P2	11
1	-	1	1	F20S2	12
1	1	-	-	F20T2	13
1	1	-	1	F20U1	14
1	1	1	-	F20U2	15

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Figure 8-2 MS780-C Starting Address, Transfer Request  
Arbitration Level Details

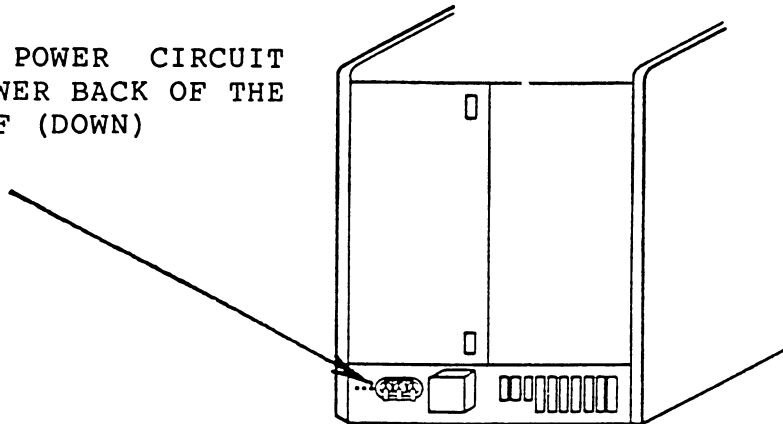
- 1 SET THE KEYSWITCH ON THE CPU CABINET CONTROL PANEL TO OFF

CAUTION  
THIS DOES NOT TURN OFF THE  
MEMORY POWER SUPPLY



TA 10009

- 2 SET THE MAIN POWER CIRCUIT BREAKER AT THE LOWER BACK OF THE CPU CABINET TO OFF (DOWN)



TA 10010

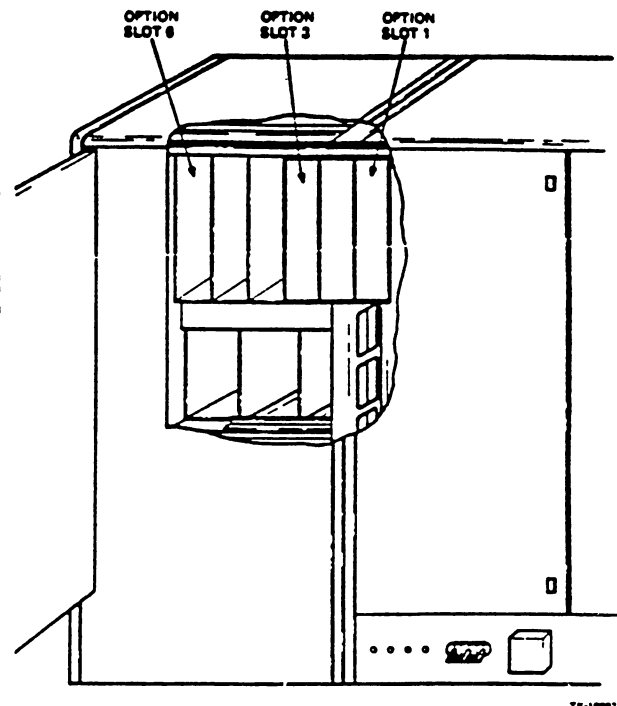
- 3 OPEN THE FRONT AND BACK DOORS ON THE EXPANDER CABINET

- 4 SLIDE THE AIR PANELS AT THE FRONT OF THE EXPANDER CABINET TO THE RIGHT

Figure 8-3 MS780-E Installation Procedure (Sheet 1 of 14)

- 5 REMOVE THE SIMULATOR PANELS FROM OPTION SLOTS 1, 2, AND 3 IN THE EXPANDER CABINET

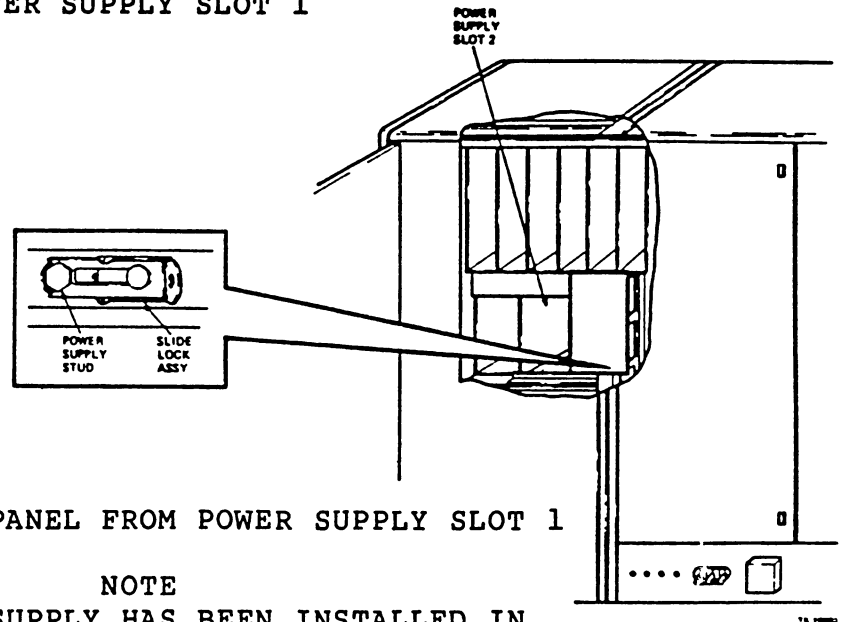
NOTE  
IF SLOTS 1, 2, AND 3 ARE OCCUPIED THE EQUIPMENT MUST BE REMOVED AND RELOCATED TO SLOTS 4, 5, AND 6. THIS WILL REQUIRE THAT THE SFT BE A M9040 IN SLOT 1 OF THE MS780-E BACKPLANE



- 6 REMOVE THE SIX SBI CABLES INTERCONNECTING THE SFT AND THE ADJACENT UNIT
- 7 DISCONNECT THE POWER PLUGS FROM SFT JACKS J2, J8, AND J9
- 8 REMOVE THE SFT MOUNTING HARDWARE AND CAREFULLY REMOVE THE SFT FROM THE BACK OF THE CPU CABINET
- 9 INSTALL THE SFT IN THE BACK OF THE CPU EXPANSION CABINET TO THE LEFT OF THE SPACE WHERE THE MS780-E WILL BE INSTALLED
- 10 ATTACH THE SFT TO THE TOP AND BOTTOM OF THE CPU EXPANSION CABINET CARD CAGE, USING THE SCREWS REMOVED FROM THE EXPANSION CABINET
- 11 INSTALL THE MS780-E CARD CAGE/BACKPLANE ASSEMBLY IN OPTION SLOTS 1, 2, AND 3

Figure 8-3 MS780-E Installation Procedure (Sheet 2 of 14)

- 12 SECURE THE MS780-E CARD CAGE/BACKPLANE ASSEMBLY WITH THREE (3) SCREWS AT THE FRONT BOTTOM AND THREE SCREWS AT THE BACK TOP
- 13 UNLOCK THE SLIDE LOCK AND REMOVE THE SCREW SECURING THE SIMULATOR PANEL IN POWER SUPPLY SLOT 1



- 14 REMOVE THE SIMULATOR PANEL FROM POWER SUPPLY SLOT 1

NOTE

IF A POWER SUPPLY HAS BEEN INSTALLED IN POWER SUPPLY SLOT 1 (NO SIMULATOR PANEL IN SLOT 1) REMOVE IT AND INSTALL IT IN POWER SUPPLY SLOT 2

CAUTION

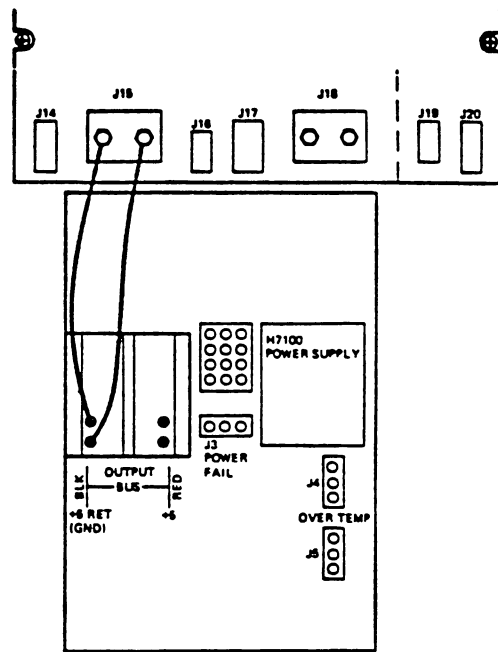
ONLY AN MS780-E POWER SUPPLY (P/N E-IA-7018759-0-0) CAN BE USED WITH AN MS780-E MEMORY ASSEMBLY

- 15 INSTALL THE MS780-E POWER SUPPLY AT THE FRONT OF THE EXPANDER CABINET IN POWER SUPPLY SLOT 1
- 16 SECURE THE MS780-E POWER SUPPLY AT THE REAR OF THE EXPANDER CABINET WITH THE SLIDE LOCK ASSEMBLY

Figure 8-3 MS780-E Installation Procedure (Sheet 3 of 14)

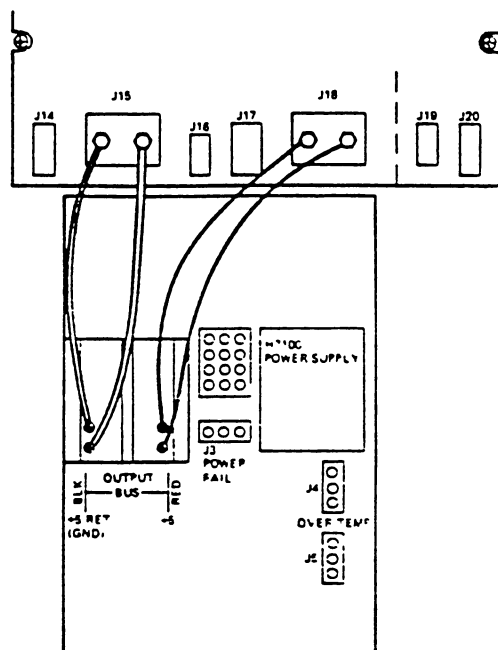
17 SECURE THE POWER SUPPLY AT THE TOP FRONT WITH ONE SCREW

18 INSTALL TWO BLACK MEMORY POWER RETURN CABLES (P/N 7014250-0K) FROM THE BLACK +5 RET (GND) OUTPUT BUS CONNECTOR ON THE POWER SUPPLY TO J15 ON THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY



70-0000

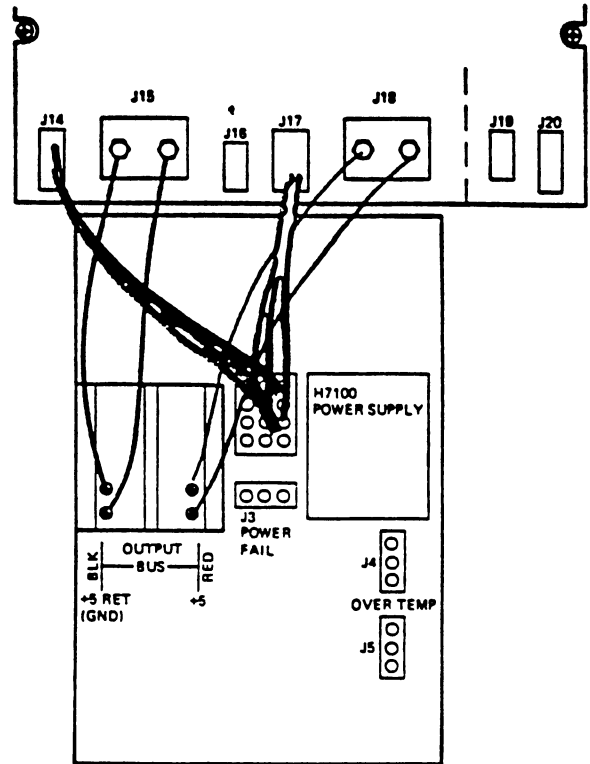
19 INSTALL TWO RED MEMORY +5 POWER CABLES (P/N 7014529-0K) FROM THE RED +5 OUTPUT BUS CONNECTORS ON THE POWER SUPPLY TO J18 ON THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY



70-0000

Figure 8-3 MS780-E Installation Procedure (Sheet 4 of 14)

- 20 INSTALL THE +5B CABLE (P/N 7019586-0K) FROM THE 15-PIN CONNECTOR ON THE POWER SUPPLY TO J14 AND J17 ON THE MS780-E BACKPLANE/CARDCAGE ASSEMBLY



- 21 SECURE THE POWER BUS WIRING (TWO RED AND TWO BLACK) AT THE POWER SUPPLY AND AT J15 AND J18 ON THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY WITH LOCKNUTS

- 22 INSTALL A PLASTIC COVER ON J15 AND J18 OF THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY

- 23 SECURE THE PLASTIC COVER WITH PLASTIC SAFETY ACORN NUTS

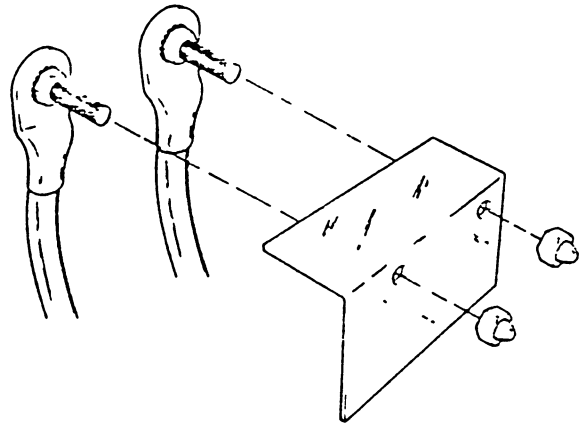
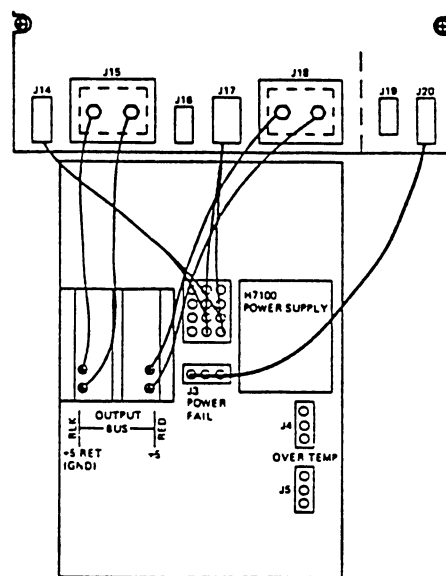


Figure 8-3 MS780-E Installation Procedure (Sheet 5 of 14)



- 24 CONNECT THE AC DC LO CABLE (P/N 7014212-1C) FROM THE J13 POWER FAIL JACK ON THE POWER SUPPLY TO J20 ON THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY



- 25 CONNECT THE -5.2 CABLE (P/N 7015073-00) PLUG P5 TO JACK J19 ON THE MS780-E CARDCAGE/BACKPLANE ASSEMBLY
- 26 CONNECT THE OVERTEMPERATURE CABLE (P/N D-IA-14213-0-000) FROM JACK J5 ON THE POWER SUPPLY TO J5 OF THE PRECEDING POWER SUPPLY IN THE CPU CABINET

Figure 8-3 MS780-E Installation Procedure (Sheet 6 of 14)

- (27) CONNECT J4 (OTHER OVERTEMPERATURE CABLE) ON THE POWER SUPPLY TO J4 ON THE FOLLOWING POWER SUPPLY.

NOTE

IF THERE IS NO FOLLOWING POWER SUPPLY  
OMIT THIS CABLE

NOTE

THE OVERTEMPERATURE CABLING IS  
DAISY-CHAIN CONNECTED FROM ONE POWER  
SUPPLY TO THE NEXT USING J4 AND J5 ON  
EACH POWER SUPPLY. THEREFORE, THE JACK  
NUMBER IS DETERMINED BY THE PRECEDING  
POWER SUPPLY AND CAN BE EITHER J4 OR J5  
(WHICHEVER ONE IS UNUSED).

- (28) INSTALL THE SIX 18-INCH RIBBON CABLES FROM MS780-E J7 THROUGH J12 TO THE LAST DEVICE IN THE CPU CABINET

- (29) INSTALL THE SIX RIBBON CABLES FROM THE MS780-E TO THE SFT (M9043)

NOTE

NO CABLE CONNECTION IS MADE TO J16 ON  
THE MS780-E CARD CAGE/BACKPLANE ASSEMBLY

Figure 8-3 MS780-E Installation Procedure (Sheet 7 of 14)

**30****DETERMINE TRANSFER REQUEST (TR) JUMPER(S), STRAPPING CONFIGURATION**

MEMORY SUBSYSTEM LEVEL	BUS TR LEVEL	J21 PIN PAIRS				CONNECT BACKPLANE WIRE (STRAP) FROM F11S1 TO
		H,J	E,F	C,D	A,B	
1	1	-	-	-	-	F11B1
2	2	-	-	-	I	F11E1
3	3	-	-	I	-	F11D1
4	4	-	-	I	I	F11F2

- NOTES:
1. I = JUMPER INSTALLED
  2. - = JUMPER NOT INSTALLED
  3. ALL MS780-E MEMORY ASSEMBLIES ARE MANUFACTURED AS MEMORY CONTROLLER NO. 1 AND THUS HAVE F11S1 WIRED TO F11B1
  4. IF THE VAX-11/780 WILL BE CONFIGURED WITH BOTH MS780-E AND MS780-C MEMORY ASSEMBLIES, THEN THE MS780-E MUST BE AT THE LOWER TR LEVEL AND HAVE ITS ROMS ENABLED. ALL OTHER MEMORY SUBSYSTEMS MUST INHIBIT ROM DECODE.

Figure 8-3 MS780-E Installation Procedure (Sheet 8 of 14)

31 INSTALL TRANSFER REQUEST (TR) JUMPER(S) AND WIRE STRAPPING

FROM ROW F  
F11S1 = SLOT 11  
SECTION S  
PIN 1

FOR TR1  
CONNECT  
WIRE  
STRAPPING  
[JUMPER(S)] TO ROW F  
F11B1 = SLOT 11  
SECTION B  
PIN 1

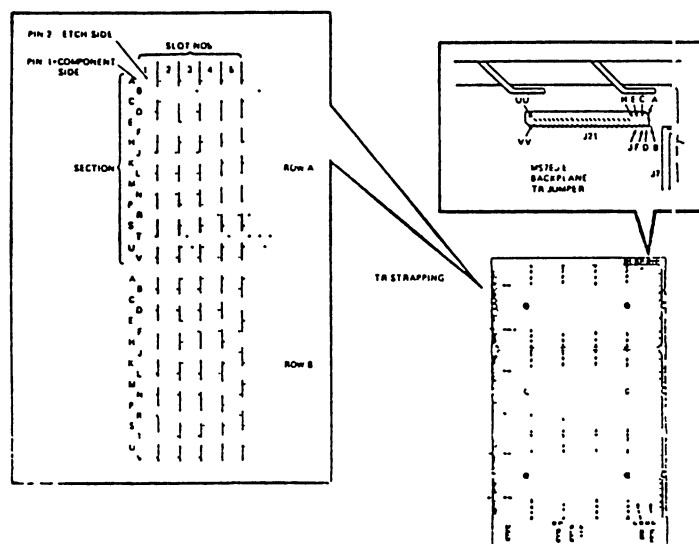


Figure 8-3 MS780-E Installation Procedure (Sheet 9 of 14)

## 32 DETERMINE FAIL STRAPPING CONFIGURATION

MEMORY SUBSYSTEM NO.	FAIL STRAPPING C11R1 TO C1V2
1	INSTALLED
2	NOT INSTALLED
3	NOT INSTALLED
4	NOT INSTALLED

### NOTE

FOR SYSTEMS EQUIPPED WITH BOTH MS780-C  
AND MS780-E MEMORY SUBSYSTEMS THE  
MS780-E MUST BE DESIGNATED SUBSYSTEM NO.  
1 (THE MEMORY CONTROLLER)

## 33 INSTALL FAIL STRAPPING

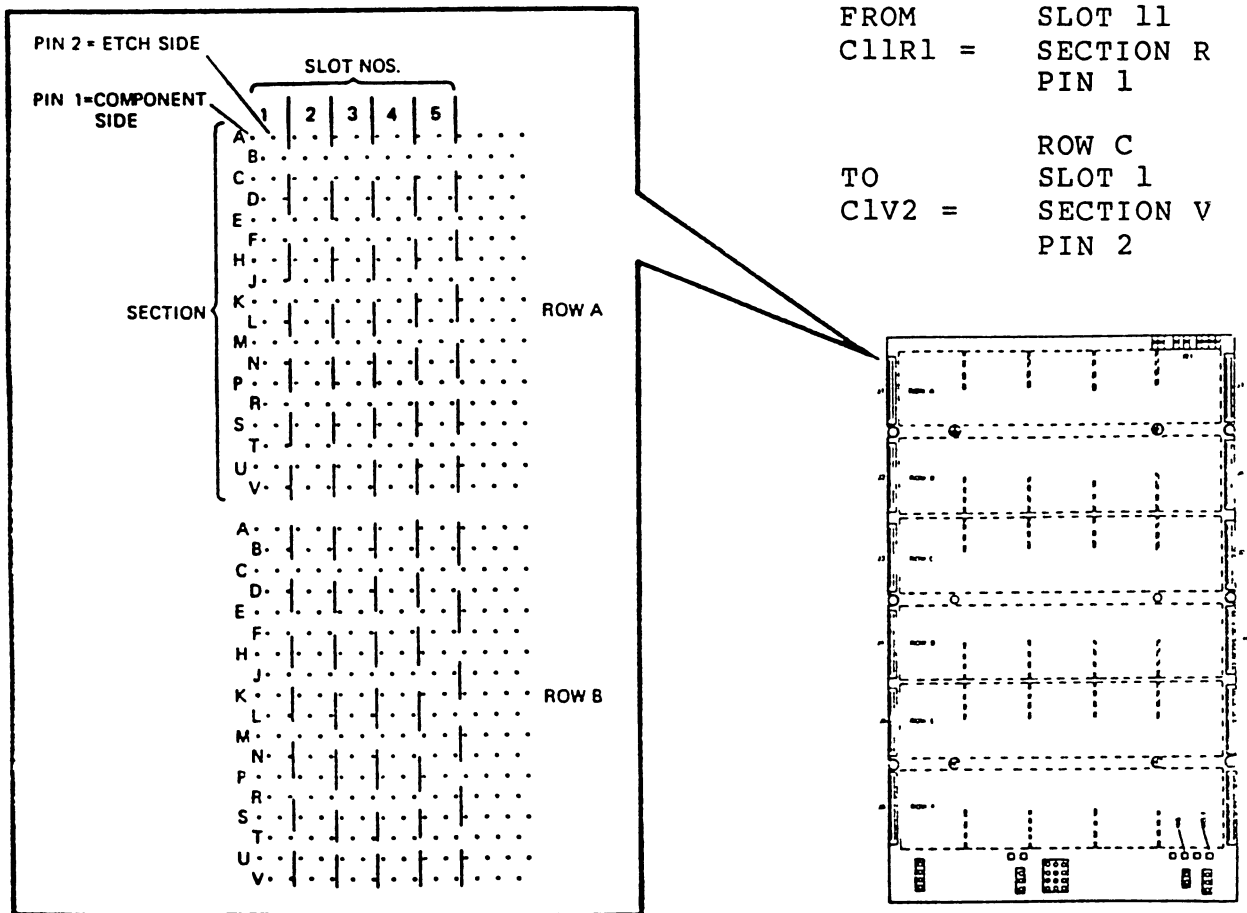


Figure 8-3 MS780-E Installation Procedure (Sheet 10 of 14)

34 DETERMINE IRD (INHIBIT ROM DECODE) JUMPER CONFIGURATION

MEMORY SUBSYSTEM NO.	IRD JUMPER J21-AA TO J21-BB
1	NOT USED
2	INSTALLED
3	INSTALLED
4	INSTALLED

NOTE  
FOR SYSTEMS EQUIPPED WITH BOTH MS780-C  
AND MS780-E MEMORY SUBSYSTEMS THE  
MS780-E MUST BE DESIGNATED SUBSYSTEM NO.  
1 (THE MEMORY CONTROLLER)

35 INSTALL IRD JUMPER

NOTE  
JUMPER CONFIGURATION SHOWN IS FOR MEMORY  
SUBSYSTEM 1 IN CPU CABINET, AND MEMORY  
SUBSYSTEM 2, 3, AND 4 (MS780-Es) IN  
EXPANDER CABINET

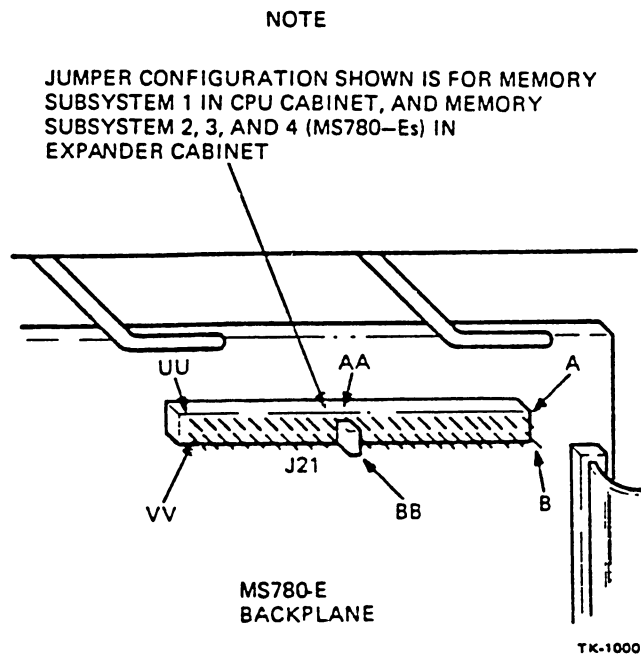


Figure 8-3 MS780-E Installation Procedure (Sheet 11 of 14)

36 DETERMINE STARTING ADDRESS JUMPER AND STRAPPING (WIRE)

MEMORY SUBSYSTEM NO.	J21-UU JUMPER	J21-SS JUMPER	MEMORY SUBSYSTEM STARTING ADDRESS AFTER COLD POWER START UP ONLY*
1	NOT USED	NOT USED	0 MEGABYTE
2	NOT USED	INSTALLED	16 MEGABYTE
3	INSTALLED	NOT USED	32 MEGABYTE
4	INSTALLED	INSTALLED	48 MEGABYTE

\* STARTING ADDRESS STRAPPING IS USED ONLY BY THE MEMORY ON COLD POWER STARTUP SO EACH MEMORY ASSUMES SOME UNIQUE PREDEFINED ADDRESS; THE ACTUAL OPERATING STARTING ADDRESS IS LOADED TO EACH MEMORY SUBSYSTEM BY THE SOFTWARE.

37 INSTALL STARTING ADDRESS STRAPPING

NOTE  
J21-SS/J21-TT JUMPER SHOWN INSTALLED FOR  
A 16-MBYTE STARTING ADDRESS

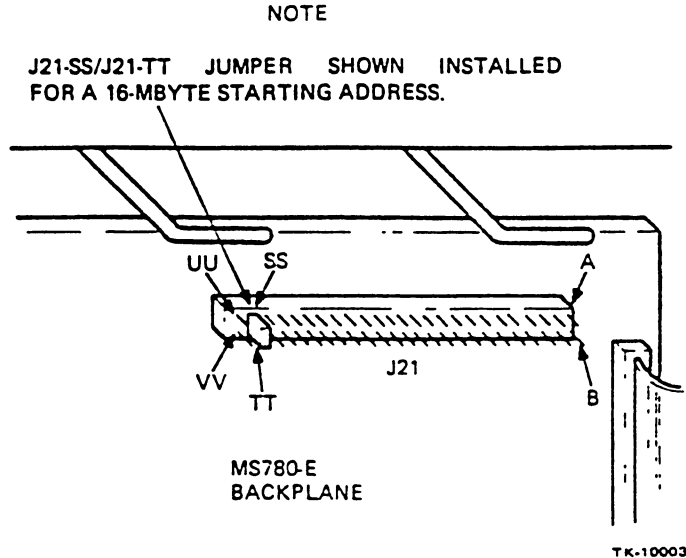


Figure 8-3 MS780-E Installation Procedure (Sheet 12 of 14)

38

INSTALL THE MS780-E MODULES IN THE ASSIGNED SLOTS PER THE  
MODULE UTILIZATION DECAL

**CAUTION**

DO NOT INSTALL AN M8375 CONTROLLER  
MODULE IN CARD CAGE SLOT 11; INSTALLATION  
OF AN M8375 IN SLOT 11 WILL CAUSE THE  
MODULE TO BE DAMAGED.

MODULE UTILIZATION MS780 E/F			
20	M8373	1MB	*
19	M8373	1MB	*
18	M8373	1MB	*
17	M8373	1MB	*
16	M8373	1MB	*
15	M8373	1MB	*
14	M8373	1MB	*
13	M8373	1MB	
12	M8375	UPPER CONTROLLER	
11	M8376	SBI INTERFACE	
10	M8375	LOWER CONTROLLER	
9	M8373	1MB	
8	M8373	1MB	*
7	M8373	1MB	*
6	M8373	1MB	*
5	M8373	1MB	*
4	M8373	1MB	*
3	M8373	1MB	*
2	M8373	1MB	*
1	M9040	SBI TERMINATOR	*
* OPTIONAL IF NOT INSTALLED USE BLANK MODULE 7014103			

PART NO 3614746-01

TK-10220

39

UNIFORMLY REPOSITION THE AIR CONTROL PANELS IN THE EXPANDER  
CABINET

Figure 8-3 MS780-E Installation Procedure (Sheet 13 of 14)



- 40 SET THE CIRCUIT BREAKER ON THE MS780-E POWER SUPPLY TO THE ON (UP) POSITION
- 41 CLOSE THE EXPANDER CABINET FRONT AND BACK DOORS
- 42 SET THE MAIN POWER CIRCUIT BREAKER AT THE LOWER BACK OF THE CPU CABINET TO ON (UP)
- 43 SET THE KEYSWITCH ON THE CPU CABINET CONTROL PANEL TO LOCAL
- 44 INSTALL THE MS780-EC/ED AWT REVISION STATUS DECAL ON THE RIGHT OR LEFT FRONT DOOR FRAME
- 45 PERFORM MS780-E DIAGNOSTICS PER PARAGRAPH 8.2.2

Figure 8-3 MS780-E Installation Procedure (Sheet 14 of 14)

BLANK

## CHAPTER 9 CI780 COMPUTER INTERCONNECT ADAPTER

### 9.1 GENERAL

The Computer Interconnect (CI) is a high-speed, serial data bus that is used to link computer subsystems (nodes) together to form a CI cluster. The CI780-AA/AB is the VAX-11/780 interface to the Computer Interconnect.

The CI installation kit includes:

1. Backplane/Cardcage Assembly with four extended hex "L" series modules
2. H7100 power supply
3. TX/RX Cable sets (2) with attached bulkhead connectors
4. Black power cables (2)
5. Red power cables (2)
6. SBI Cables (6)
7. AC/DC LO cable
8. Overtemperature cable
9. -5V cable
10. Blank module assembly

The CI780 can be installed in the CPU cabinet or in an SBI expansion cabinet.

#### CAUTION

The modules that comprise the CI780 contain components that could be damaged by electrostatic discharge. Do NOT

handle without the use of a VELOSTAT<sup>TM</sup> Kit, CD Kit #A2-W0299-10, or other approved antistatic material. Install the VELOSTAT kit per Chapter 3.

### 9.2 INSTALLATION

#### 9.2.1 System Shut-Down

#### NOTE

Check with the system manager before shutting the system down.

1. Shut down the system from the console terminal.
  - a. Login to the "SYSTEM" account
  - b. Run "SHUTDOWN" by:
 

typing @SYS\$SYSTEM:SHUTDOWN, and  
answering the questions asked by the program
2. Set the front panel keyswitch at the top front of the CPU cabinet to the "OFF" position.
3. Set the main power circuit breaker at the lower back of the CPU cabinet to the off (down) position.
4. Disconnect the primary power cable from the power outlet.

### 9.2.2 CI780 CPU Cabinet Installation

#### 9.2.2.1 Power Supply Installation (CPU Cabinet) -

##### NOTE

If the CI780 and another VAX-11/780 option are to be operated via a common power supply the H7100 MUST be P/N 7014956 (with the H7101 -5V regulator). Remove the existing option power supply in step 2 below.

1. Open the front and back CPU cabinet doors.
2. Remove the option power supply panel (Figure 9-1).
3. Carefully slide the H7100 power supply (P/N 7014956) into the empty slot from the front.

##### NOTE

Be sure to align the rear locking pin of the power supply to the hole at the back of the mounting chassis.

4. Secure the front of the power supply to the chassis with an 8 x 32 screw.
5. Secure the power supply locking pin with chassis slide lock assembly (Figure 9-2).

#### 9.2.2.2 Backplane Assembly Installation (CPU Cabinet) -

1. At the back of the cabinet remove and save the six 12" SBI jumper cables (P/N 1700087-01) connecting J1 through J6 of the System Far End Terminator (SFT) to J1 through J6 of the adjacent backplane to the right of the SFT.

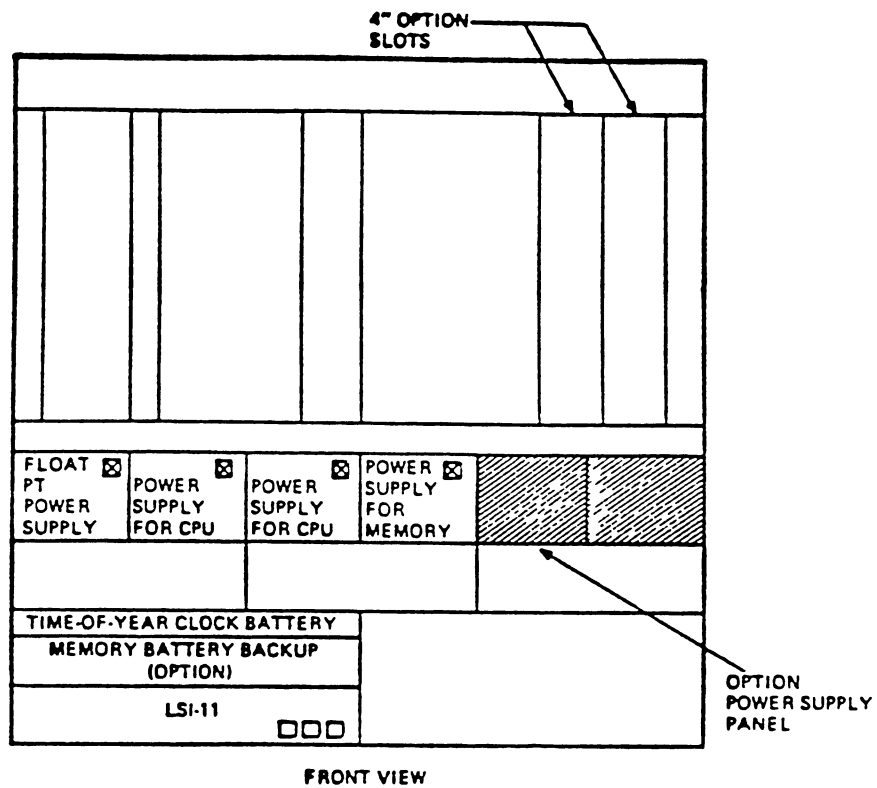
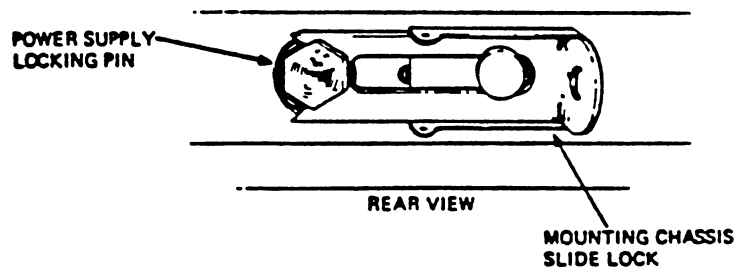


Figure 9-1 Option Mounting Slots - Location Diagram



TK-6774

Figure 9-2 Power Supply Slide Lock Assembly

**NOTE**  
**These cables will be used to**  
**interconnect the CI780 and the SFT.**

2. Remove the blank panel from the next empty 4" option slot (Figure 9-1).
3. Carefully slide the CI780 backplane assembly into the empty slot from the back of the cabinet.
4. Secure the backplane assembly to the front and back of the chassis using four 8 X 32 screws.
5. Install the CI780 Module Utilization Label (P/N 3618809-01) on the front inside, left vertical cabinet channel.
6. Continue with paragraph 9.2.5 excluding step 1.

#### 9.2.3 CI780 SBI Expansion Cabinet Installation

##### 9.2.3.1 System Shut-Down - Shut Down The System Per Paragraph 9.2.1 -

##### 9.2.3.2 Power Supply Installation (In H9652) -

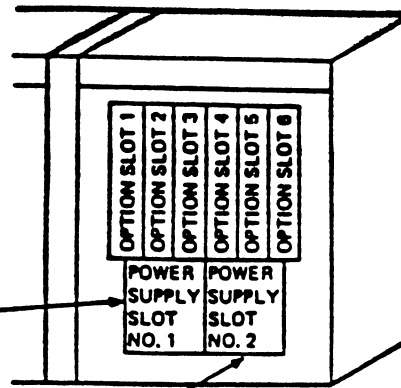
**NOTE**  
If the CI780 and another option are to receive power from a common power supply an H7100 with an H7101 -5V regulator (P/N 7014956) MUST be the power supply used. Remove the existing power supply per step 2 below.

1. Open the front and back expansion cabinet covers.
2. Remove the option power supply panel from the next empty power supply slot (Figure 9-3).
3. Carefully slide the H7100 power supply (P/N 7014956) into the empty slot from the front and then secure it with the slide lock assembly.
4. Secure the front of the power supply to the chassis with an 8 X 32 screw.

##### 9.2.3.3 System Far-End Terminator (SFT) Relocation -

1. Remove and save the six 12" SBI jumper cables (P/N 1700087-01) connecting J1 through J6 of the System Far End Terminator (SFT) to J1 through J6 of the adjacent backplane to the right of the SFT.

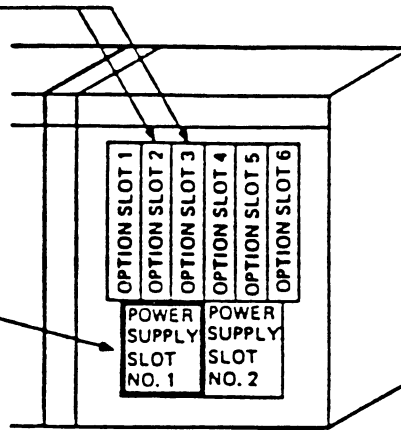
AN H7100 INSTALLED AS  
POWER SUPPLY NO. 1  
BECOMES DEDICATED  
TO OPTION SLOTS 1, 2, AND 3



H9652  
FRONT VIEW

AN H7100 INSTALLED AS  
POWER SUPPLY NO. 2  
BECOMES DEDICATED  
TO OPTION SLOTS 4, 5,  
AND 6

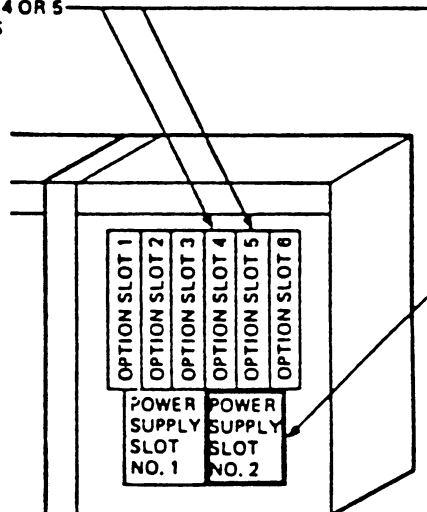
CI780 BACKPLANE MUST  
BE INSTALLED IN SLOT 2 OR 3  
IF H7100 INSTALLED AS  
POWER SUPPLY NO. 1



H9652  
FRONT VIEW

TR-6772

CI780 BACKPLANE MUST  
BE INSTALLED IN SLOT 4 OR 5  
IF H7100 INSTALLED AS  
POWER SUPPLY NO. 2



H9652  
FRONT VIEW

TR-6772

Figure 9-3 Expansion Cabinet Option Mounting Slots



2. Disconnect the cable harness plugs P7, P8, and P9 from the lower portion of the SFT.
3. Remove and save the ten screws that hold the SFT to the blank panel and then remove the SFT.
4. Mount the SFT on a blank panel to the left of the 4" option slot that will contain the CI780 backplane assembly (Figure 9-3).
5. Secure the SFT to the blank panel using the ten screws saved in step 3.
6. Connect plugs P7, P8, and P9 from the cabinet cable harness to J7, J8, and J9 on the SFT.

#### 9.2.4 Backplane Assembly Installation (In H9652)

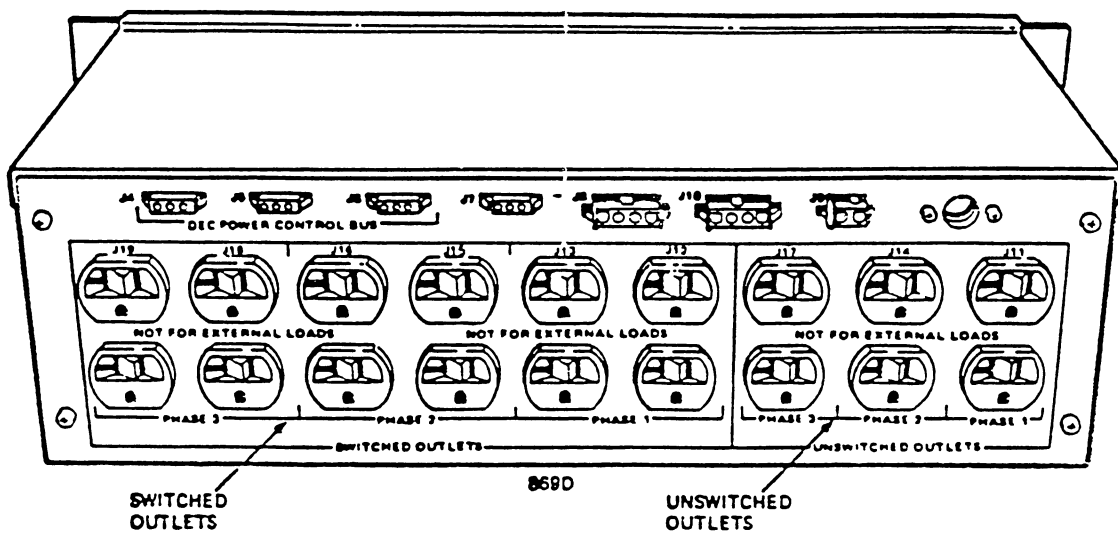
1. Remove the blank panel from the 4" option slot where the backplane assembly (Figure 9-3) will be installed.
2. Carefully slide the backplane assembly (P/N 7017654) into the empty slot from the back of the cabinet and secure it with four 8 X 32 screws.
3. Install the CI780 Module Utilization label (P/N 3618809-01) on the inside of the left vertical cabinet channel.

#### 9.2.5 Cable Interconnections

1. Remove the exhaust plenum from the lower rear of the cabinet.
2. Interconnect an unused switched outlet on the power controller (Figure 9-4) and J1 on the power supply (Figure 9-5) with the AC power cable.
3. Secure the two BLACK cables (P/N 7014249-0L) from the backplane assembly to the RETURN terminals on the LEFT side of the power supply output bus, using two 10 x 32 screws and lock washers (Figure 9-6).
4. Secure the two RED cables (P/N 7014530-0L) from the backplane assembly to the +5V terminals on the RIGHT side of the power supply output bus, using two 10 X 32 screws and lock washers.

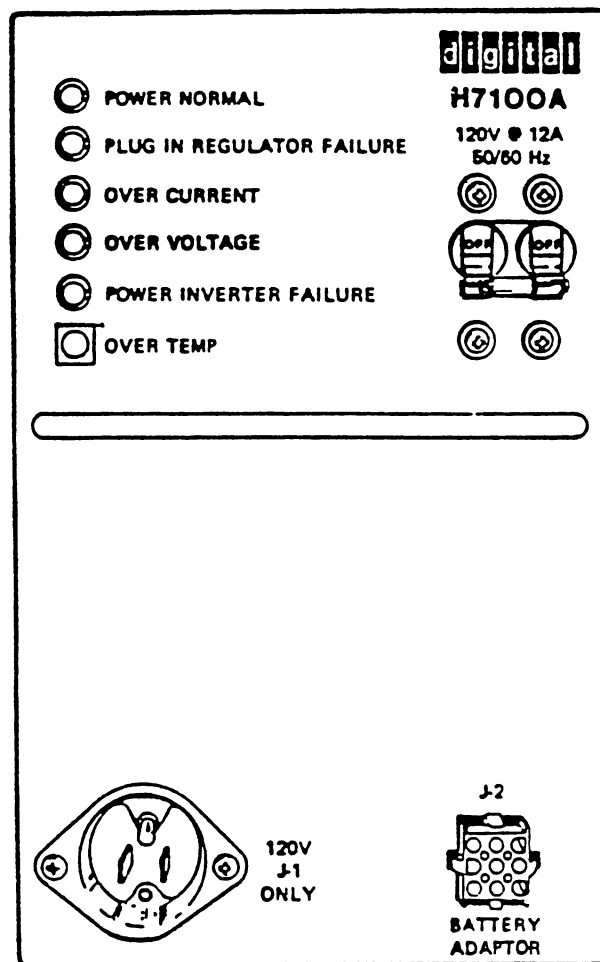
#### NOTE

Incorrect connection of the +5V (red) and return (black) power cables will result in serious damage to CI780 modules.



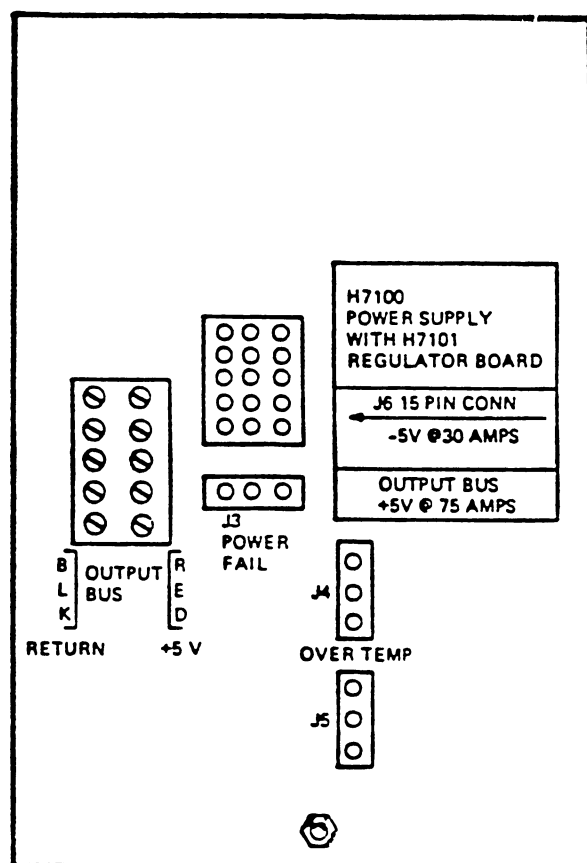
TK-8775

Figure 9-4 8698/869D Power Controllers - Rear View



TK-0441

Figure 9-5 H7100 Power Supply - Front View



TK-4771

Figure 9-6 H7100 Power Supply - Rear View

5. Connect P6 on the -5V cable (P/N 7018524-1F) to J6 (unlabeled 15-pin connector) on the power supply.
6. Connect P1 on the AC LOW/DC LOW cable (P/N 7014212-0M) to J3 on the power supply.
7. Connect the OVER TEMP cable (P/N 7014213-OK) from J4 on the CI780 power supply to J4 on the next option power supply (if present).
8. Locate and connect the cabinet harness OVER TEMP cable (P/N 7014213-4A in CPU cabinet, P/N 7016001-4A in H9652 expansion cabinet) to J5 on the power supply.
9. Connect P16 (Figure 9-7) on the -5V cable (P/N 7018524-1F) from the power supply to J16 on the backplane.
10. Connect P2 on the AC LOW/DC LOW cable (P/N 7014212-0M) from the power supply to J13 on the backplane.
11. Locate and connect P3 (plug number may vary depending on the option slot) on the -5V cabinet cable harness (P/N 7015073-0-0 in CPU cabinet, P/N 7015630-00 in H9652 cabinet) to J15 on the backplane.
12. Connect six 4" SBI jumper cables (P/N 1700087-00) from J7 through J12 on the CI780 backplane (Figure 9-8) to J1 through J6 on the adjacent backplane to the right of the CI780.

**NOTE**

Always connect SBI jumper cables with the "SIGNAL" label on the outside of the loop.

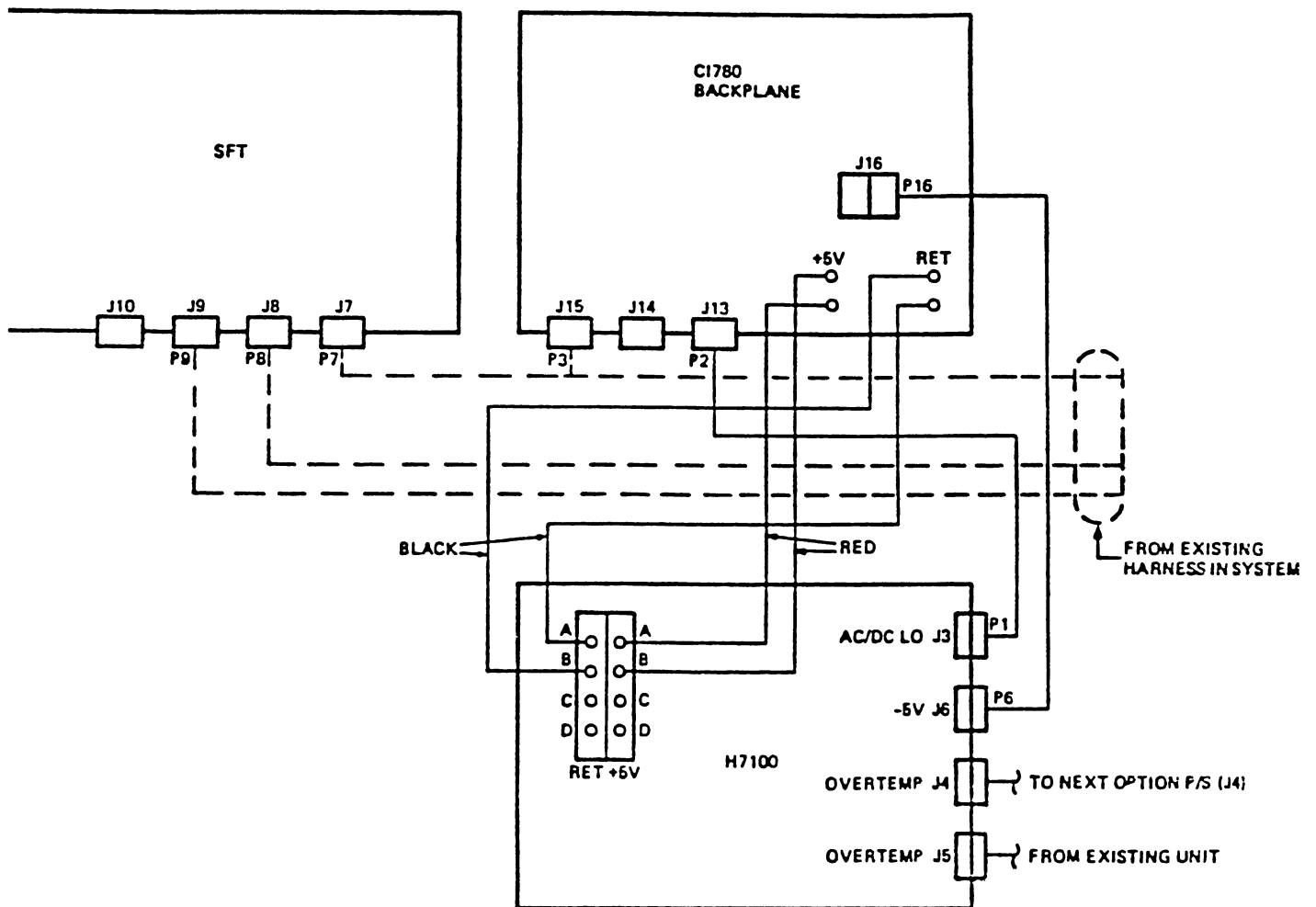
**NOTE**

If the CI780 is the first option installed in an H9652 cabinet, use the 18" SBI jumper cables (P/N 1700087-03) supplied with the H9652 cabinet.

13. Connect six 12-inch SBI jumper cables (P/N 1700087-01) from J1 through J6 on the CI780 backplane to J1 through J6 on the SFT.

#### **9.2.6 TX/RX Bulkhead Cable Assemblies Installation**

Two sets of TX/RX bulkhead cable assemblies are supplied with the CI780. One set is used for signal path A (P/N 7018527-00), and the other set is used for signal path B (P/N 7018527-01). These cables should be routed and connected from the back of the cabinet.



7&474

Figure 9-7 CI780 Power Connection Details

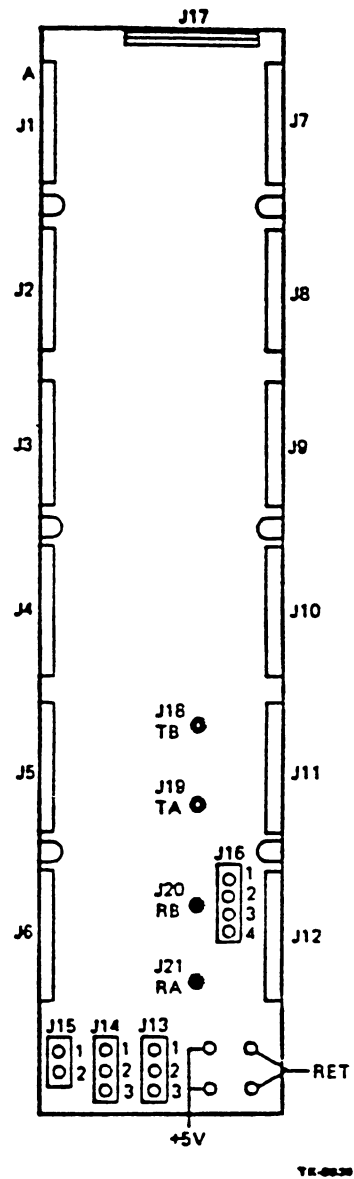


Figure 9-8 CI780 Backplane Connectors

1. Mount the bulkhead connector plate cable assembly (Figure 9-9 for CPU cabinet installation or Figure 9-10 for expansion cabinet installation) from the inside of the cabinet, to MASSBUS cutouts on the I/O panel at the bottom of the cabinet.
2. Secure the TX/RX "A" bulkhead connector plate to the first available cutout on the right side of the panel using four 8 X 32 screws.
3. Secure the TX/RX "B" bulkhead connector plate to the next adjacent cutout on the left using four 8 X 32 screws.
4. Route the four coaxial cables up through the cabinet cable ways to the backplane.

#### NOTE

Avoid sharp bends, kinks, or twists in the cables.

5. Place a P-clamp (Figure 9-11) over each cable, just behind the pin plug on the end, and carefully insert the plug into the proper jack on the backplane. Gradually push the cable plug into the jack until it is secured by the detent lock.

1. Transmit B (TB) to J18 on the backplane.
2. Transmit A (TA) to J19 on the backplane.
3. Receive B (RB) to J20 on the backplane.
4. Receive A (RA) to J21 on the backplane.

6. Secure the P-clamp on each cable to the plastic cable support with a 10 X 32 screw, washer, and nut.

7. Reinstall the exhaust plenum at the back of the cabinet.

### 9.2.7 Jumpers and Switches Configuration

There are two types of CI780 backplane jumpers: 1) a row of seventeen jumpers on header jack J17 (Figure 9-12) that are used to select various hardware options via jumper plugs, and 2) an additional wirewrap jumper located on slot 1, row C to connect the SBI interface logic to the desired TR arbitration level.

The CI780 is manufactured with backplane jumpers installed and slot C01 pins wirewrapped for a single cluster configuration. This consists of one CI780 installed per VAX-11/780 system, set up as follows:

1. SBI TR Arbitration Level - 14
2. SBI BR Priority Level - 4



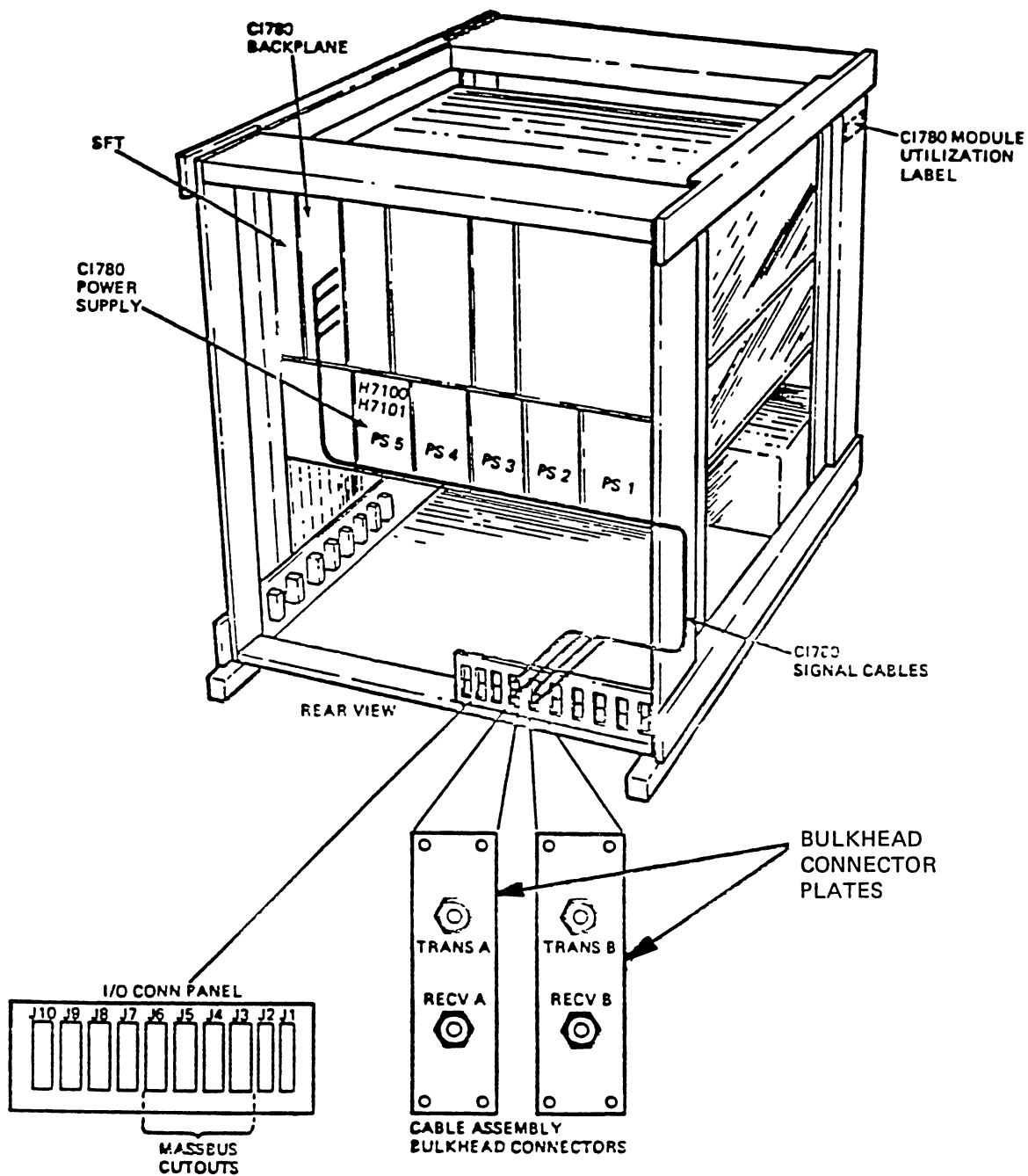


Figure 9-9 CPU Cabinet Assembly Connection Details

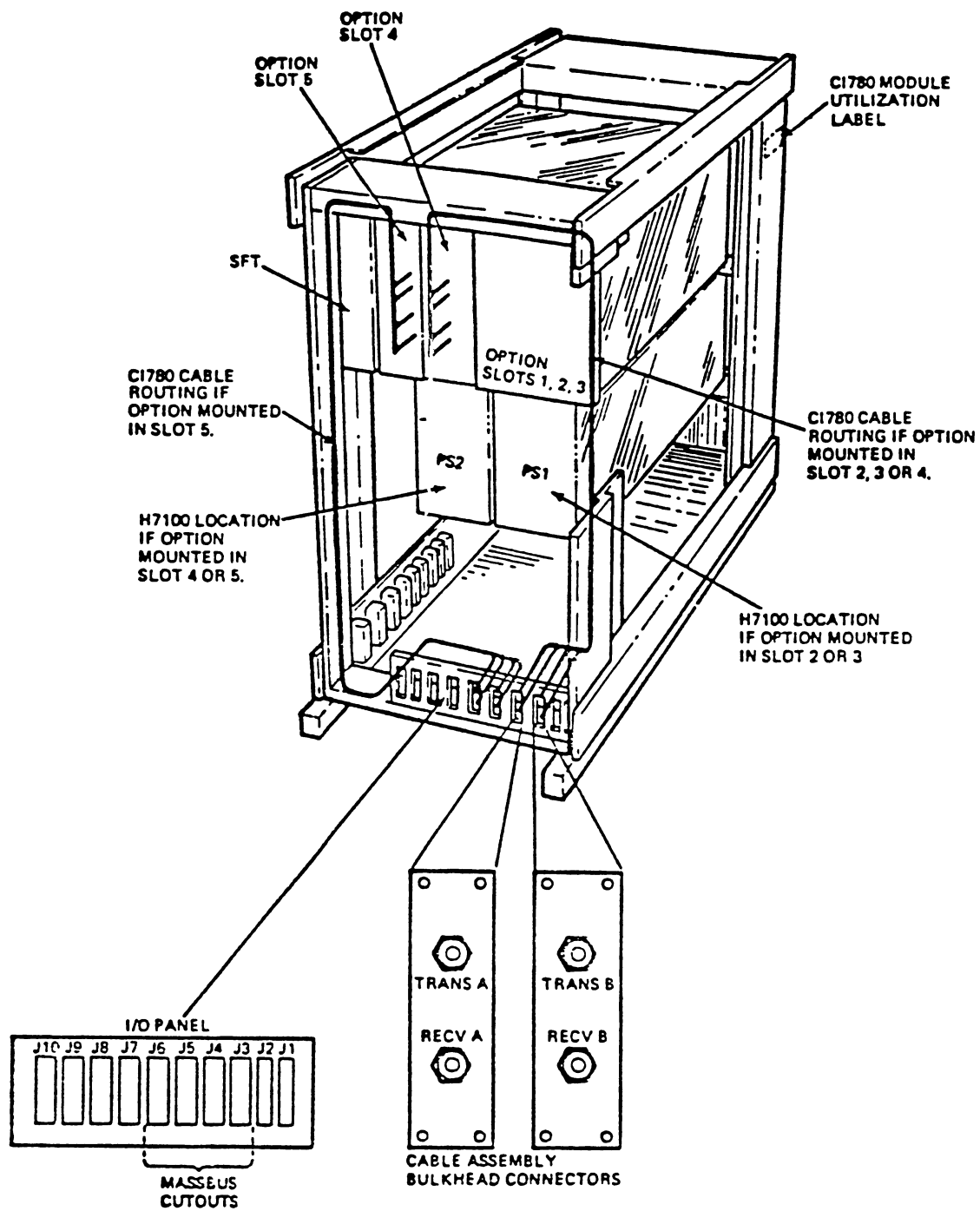
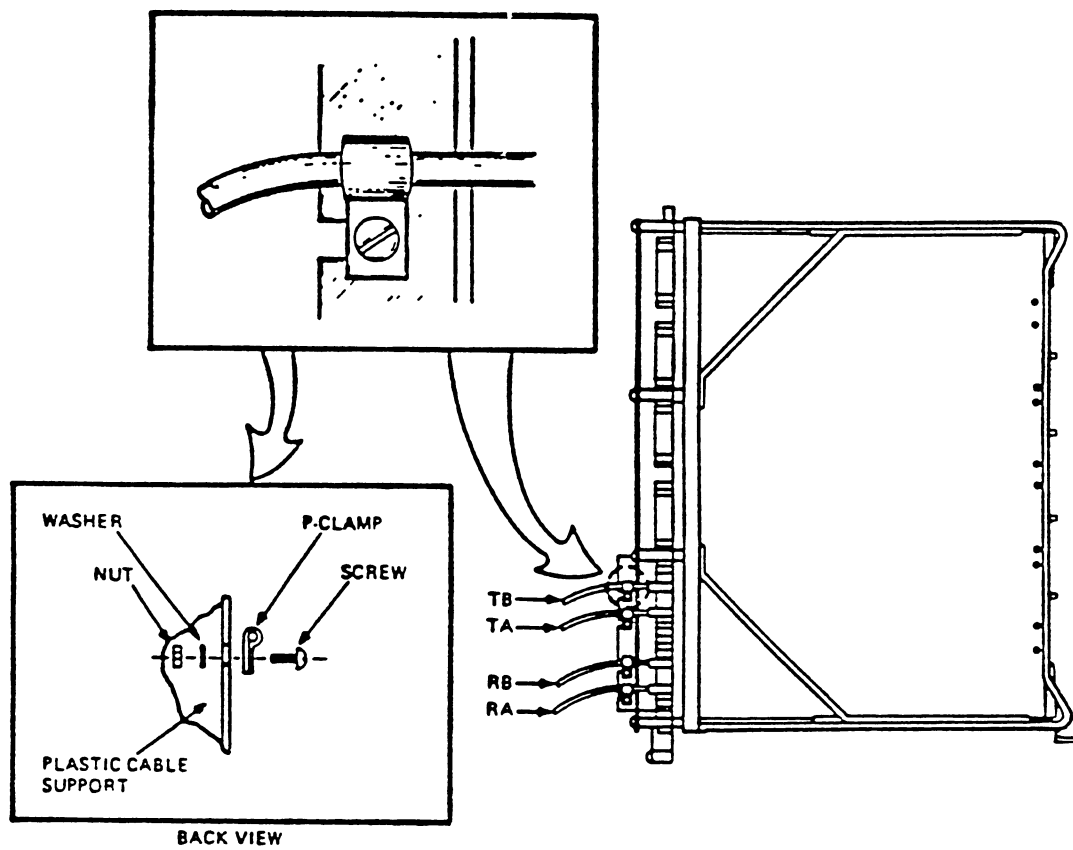
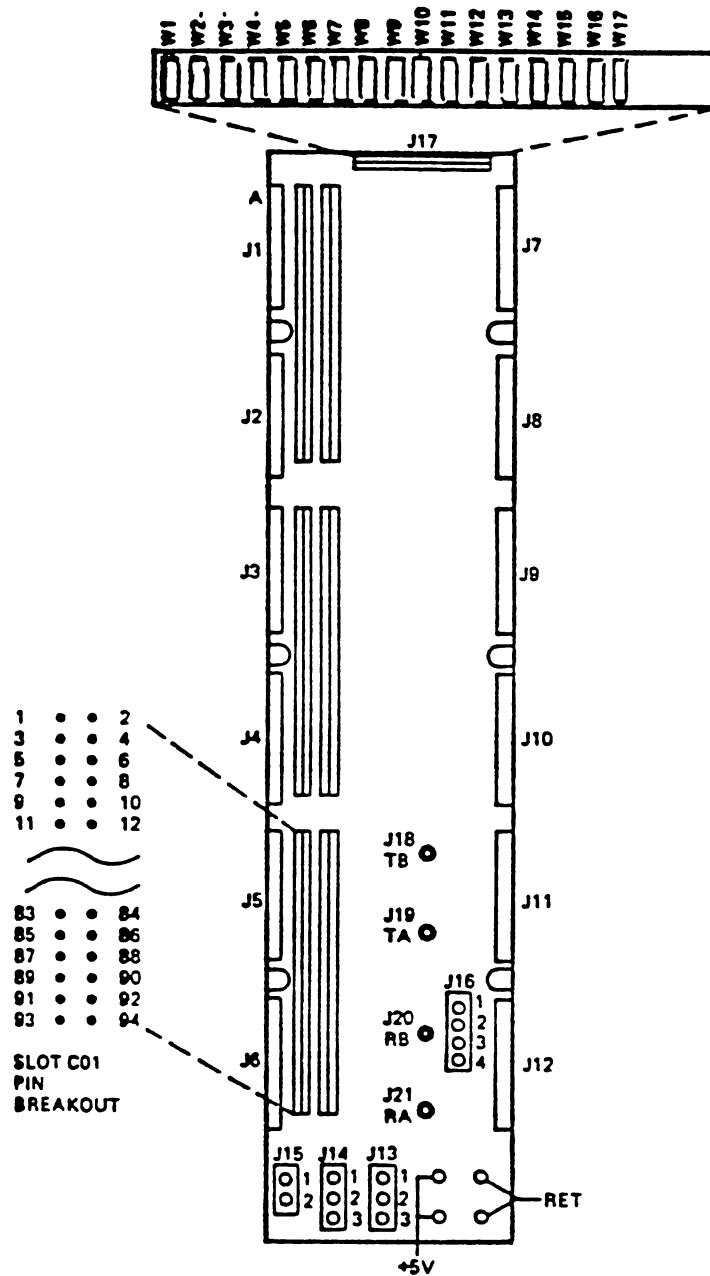


Figure 9-10 Expansion Cabinet Cable Assembly Connection Details



TR-8766

Figure 9-11 CI780 Backplane Cable Assembly Connection Details



TK-0840

Figure 9-12 CI780 Backplane Jumpers (Sheet 1 of 4)

# TR ARBITRATION LEVEL (W2, W3, W4, W7 and C01-53 Wirewrap

TR NO.	W2	W3	W7	W4	C01-53 TO
1	OUT	OUT	OUT	OUT	C01-57
2	OUT	OUT	OUT	IN	C01-63
3	OUT	OUT	IN	OUT	C01-62
4	OUT	OUT	IN	IN	C01-65
5	OUT	IN	OUT	OUT	C01-69
6	OUT	IN	OUT	IN	C01-71
7	OUT	IN	IN	OUT	C01-73
8	OUT	IN	IN	IN	C01-75
9	IN	OUT	OUT	OUT	C01-77
10	IN	OUT	OUT	IN	C01-81
11	IN	OUT	IN	OUT	C01-83
12	IN	OUT	IN	OUT	C01-85
13	IN	IN	OUT	OUT	C01-86
14	IN	IN	OUT	IN	C01-87
15	IN	IN	IN	OUT	C01-88

## NOTE

TR NO. 0 is reserved as the HOLD line

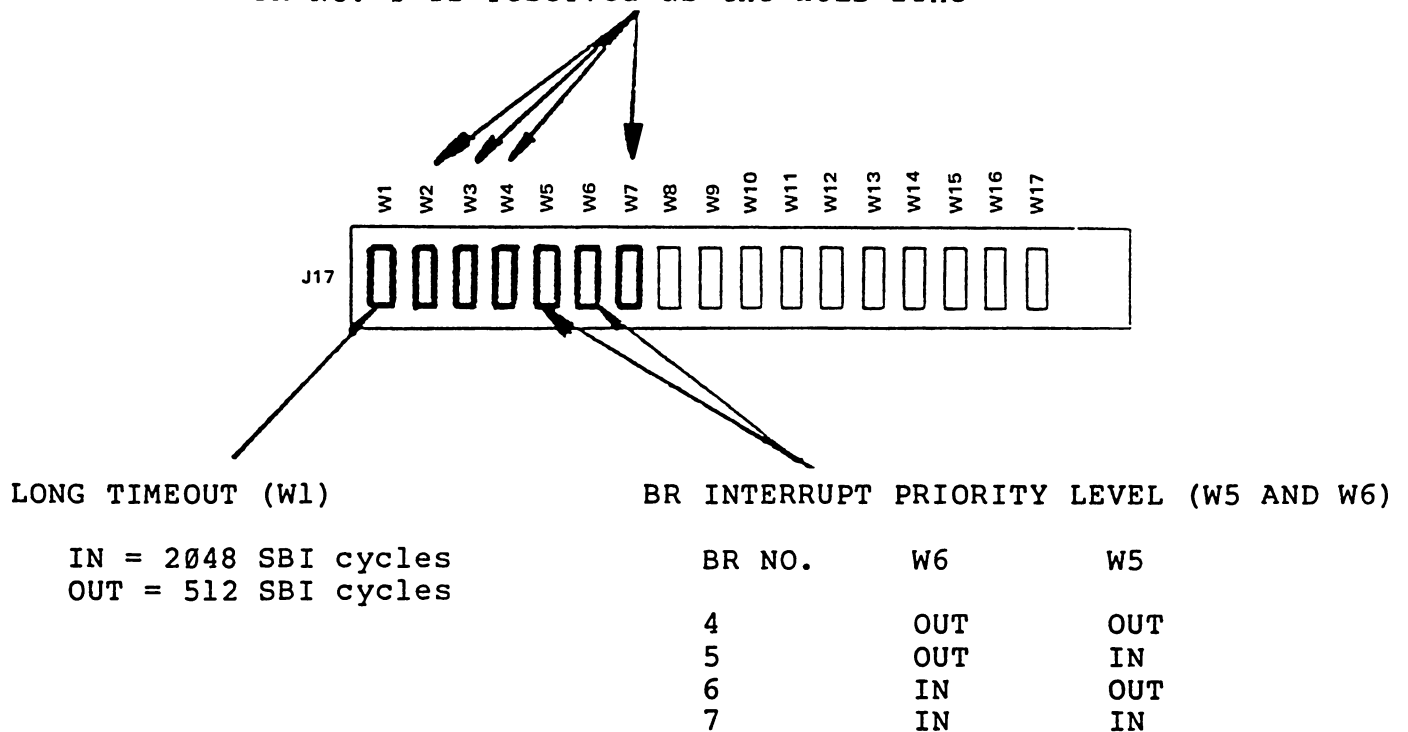
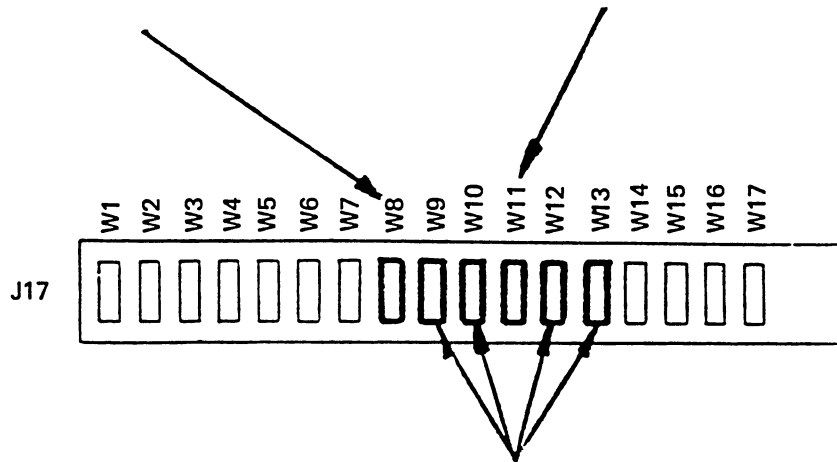


Figure 9-12 CI780 Backplane Jumpers (Sheet 2 of 4)

## PANIC MODE (W8)

IN = Panic Mode Disabled  
OUT = Panic Mode Enabled

RESERVED (W11)



## BOOT TIMER (W9, W10, W12, W13)

TIME (Sec)	W9	W13	W10	W12
1500	OUT	OUT	OUT	OUT
1400	OUT	OUT	OUT	IN
1300	OUT	OUT	IN	OUT
1200	OUT	OUT	IN	IN
1100	OUT	IN	OUT	OUT
1000	OUT	IN	OUT	IN
0900	OUT	IN	IN	OUT
0800	OUT	IN	IN	IN
0700	IN	OUT	OUT	OUT
0600	IN	OUT	OUT	IN
0500	IN	OUT	IN	OUT
0400	IN	OUT	IN	IN
0300	IN	IN	OUT	OUT
0200	IN	IN	OUT	IN
0100	IN	IN	IN	OUT
0000	IN	IN	IN	IN

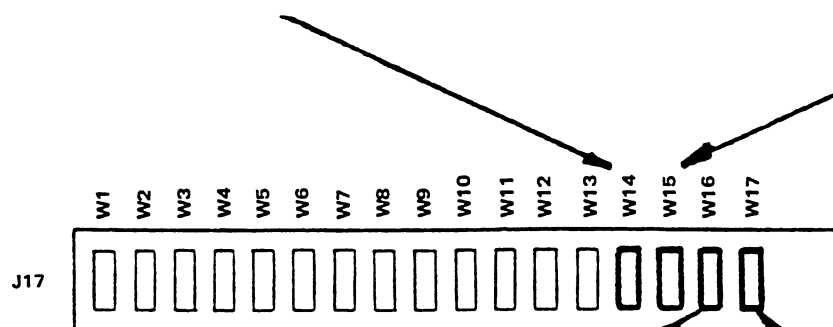
Figure 9-12 CI780 Backplane Jumpers (Sheet 3 of 4)

DISABLE ARBITRATION (W14)

IN = Disable Normal Arbitration  
OUT = Allow Normal Arbitration

EXTEND HEADER/TRAILER (W15)

IN = Extended Header/Trailer  
OUT = Normal Header/Trailer



ALTER DELTA TIME (W16)

IN = Long Delta Time  
OUT = Short Delta Time

EXTEND ACKNOWLEDGEMENT TIMEOUT (W17)

IN = Long Timeout  
OUT = Short Timeout

Figure 9-12 CI780 Backplane Jumpers (Sheet 4 of 4)

### 9.2.7.1 Backplane Jumper Configuration Check -

1. Jumpers W2, W3, and W4 on J17 should be IN. All others should be OUT.
2. Pin C01-53 should be wirewrapped to pin C01-87.

9.2.7.2 Link Module Switches Configuration - The Link Interface Module (L0100) switches (Figure 9-13) are used to provide the system with a unique node address within a CI cluster. This address will typically be a number from 0 to 15. A NODE ADDRESS is assigned, each of the two switch packs (S1 and S2) on the Link Module must be set to the binary value of the assigned number.

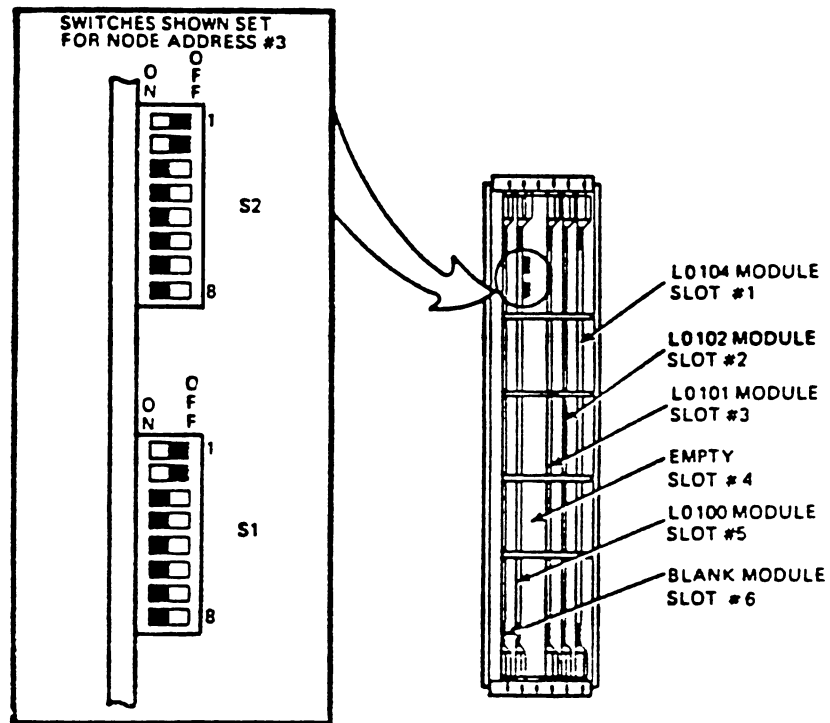
1. Assign the system a node address.
  1. For CI780 installations that create a new CI cluster, assign a node address within the range of the number of CI780s being installed.
  2. For CI780 installations that add a node to an existing CI cluster, determine the highest node address currently in use and assign the next higher sequential number.

#### NOTE

Difficult-to-diagnose software failures will occur if two nodes in a cluster are assigned the same address.

3. Without removing the Link Module from the CI780 backplane, set S1 and S2 to the assigned node address. The ON (closed) position of each switch represents a logical zero, and the OFF (open) position a logical one.
  1. Set S1-1 through S1-8 to the binary value of the assigned node address.
  2. Set S2-1 through S2-8 to the binary value of the assigned node address.
  3. Install the node address identification label [part of a set (P/N 3619264-17)] at eye level on the outside of the rear door of the cabinet the CI780 was installed in.





TK-4767

Figure 9-13 Link Module Switch Details

### 9.3           DIAGNOSTICS

Acceptance testing of the CI780 is basically a two-step procedure:

1. The newly installed CI780 is operationally verified stand-alone (i.e., not connected to the CI).
2. The system is connected to the STAR coupler and operationally verified as a node within the CI cluster.

Stand-alone verification consists of running the system microdiagnostics, which contain CI780 support, followed by the CI780 Level 3 diagnostics ESCGA, ESCGB, ESCGC, ESCGD, EVGAA, EVGAB and UETP.

Operational verification of the system within the CI Cluster consists of:

1. Connecting the node to the STAR Coupler and verifying the connection by running the CI Exerciser (named EVXCI) program, under the operating system.
2. Running a copy of the User Environment Test Package (UETP) on the node under test.

#### NOTE

If all of the VAX nodes within a CI cluster are being tested, then UETP must be run on each node.

#### 9.3.1       CI780 Check-Out Procedure (Stand-Alone)

1. Power-up the system.
2. Run the VAX-11/780 microdiagnostics.

To determine if the CI780 is functioning properly, the following Level 3 diagnostic programs must be run.

ESCGA - CI780 Repair Level Diagnostic 1  
ESCGB - CI780 Repair Level Diagnostic 2  
ESCGC - CI780 Repair Level Diagnostic 3  
ESCGD - CI780 Repair Level Diagnostic 4  
EVGAA - CI780 Functional Diagnostic Part 1  
EVGAB - CI780 Functional Diagnostic Part 2

Before loading the diagnostics, make the following connections to the I/O connector panel at the back of the cabinet.

1. Using one of the attenuator pads (P/N 1219907-01) and two of the SC008 modularity cables (P/N 7018530-00) supplied in the CI780 CD Kit, connect the "TRANSMIT A" bulkhead connection.
2. Perform the same connection for path "B" using the other attenuator pad and two SC008 modularity cables from the CI780 CD Kit. Connect "TRANSMIT B" to "RECEIVE B".

Use the following procedure to load the diagnostic programs into the system.

1. Put the VAX-11/780 in a stable, halted condition.
2. Initialize and unjam the SBI via console commands:  
  
INIT UNJAM
3. Load the diagnostic supervisor, ESSAA.EXE, via the command BOOT (or LOAD ESSAA.EXE/ST:FE00), from the diskette or BOOT it from the system disk.
4. Load the diagnostic program by its designation letters, i.e., LOAD ESCGA.
5. Attach the device to be tested, i.e.,  
  
DS> ATTACH CI780 SBI UNIT# (PAA0) TR (14) BR (4) NODE (0)
6. Select the unit to be tested via the command SELECT (UNIT#), i.e.  
  
DS> SELECT PAA0
7. Set any desired supervisor flags.  
  
DS> CL ALL  
DS> SET Q,T,H
8. Start the diagnostic program.

NOTE

Diagnostics ESCGB and ESCGD contain manual intervention test sections. Run them after the diagnostic has been loaded by typing:

DS> START/SECTION:MANUAL

and performing the required manual actions listed by the diagnostic printout.

When running the diagnostics for the first time after installing the CI780, run them in order from ESCGA through ESCGD and EVGAA through EVGAB, and include the manual intervention test sections. Diagnostics EVGAA and EVGAB require setting of EVENT FLAG #1 on new installations to load test microcode into the CI780 during the start sequence.

9. After successfully running the six diagnostics, remove the attenuator pads and modularity cables from the I/O panel bulkhead connectors.
10. Connect the CI bus cables (BNCIA-XX) to the bulkhead connectors.
11. Connect the two attenuator pads to the ends of the CI cables. Be sure to connect "TRANSMIT A" to "RECEIVE A" and "TRANSMIT B" to "RECEIVE B".
12. Run the EXTLOOP section of diagnostic ESCGD five times to test the CI cables prior to routing and connecting them the SC008 by typing:  
  
 DS> LOAD ESCGD  
 DS> START/SECTION:EXTLOOP/PASS:5
13. Remove the attenuator pads and repeat steps 10-12 after the CI bus cables have been routed and connected to the SC008.

**NOTE**

Section 2.4 of the Start Coupler User's Guide contains the cable routing procedure.

**9.3.1.5 Run UETP**

**9.3.2 On-Line Testing of the CI780 and the CI Cluster**

**9.3.2.1 Software Installation** -- The VAX-11/780 in which the CI780 is installed must be running VAX/VMS Version 3.1 in order to use the CI780. Therefore, the additional software needed to support the CI780 must be installed.

**SYE KIT** -- An SYE (error log report generator) kit consisting of two floppy diskettes (AS-N761A-BE and AS-N762A-BE) is supplied in the CI780 software box, BX-Q3113-TE.

1. To install the SYE kit you will need 2000 free blocks on your system disk.
2. Log in as the system manager and execute the following DCL commands:  
  
 \$ SYE DEFAULT SYS\$UPDATE  
 \$ @VMSUPDATE
3. Perform the tasks asked by the system.

CI780 MICROCODE -- The CI780 microcode must reside on the console floppy diskette. If it is not there and the CI780 hardware is installed, then you will see the following warning when VMS boots:

%BOOT-W-Unable to find CI ucode file

1. Make sure that the console floppy diskette is in the drive. Type the following commands, which list the names of the files the floppy contains:

```
$ RUN SYS$SYSTEM:FLX
FLX> CS1:/RT/LI
FLX> CTRL Z
```

2. Look for the file CI780.BIN (36 blocks long). That file contains the CI780 microcode. If it is present, then skip the remainder of this procedure. If it is not present, then note the number of free blocks on the console floppy diskette, and proceed to step 3. Steps 3 through 10 build a new console floppy that includes both the files present on your current console floppy that are important to your site, and the CI780 microcode.
3. Copy your present floppy files into a Files-11 disk directory using the command procedure CONSCOPY.COM. Directions for using this command procedure are outlined in Section 6.1 of the VAX-11/780 Software Installation Guide.
4. Set your default to the Files-11 directory containing the contents of the console floppy diskette copied in step 3. Refer back to the FLX directory obtained of the console floppy in step 1 to see if there are at least 36 free blocks. If not, delete PCS.PAT, which is no longer needed, from the Files-11 directory.
5. Remove the console floppy from the drive.
6. Insert the console floppy diskette shipped in the CI780 software box (AS-T213A-DE).
7. Type the following commands, which copy the CI780 microcode file from the new console floppy to your Files-11 directory:

```
$ RUN SYS$SYSTEM:FLX
FLX> /RS/IM=CS1:CI780.BIN/RT
FLX> CTRL Z
```

8. Remove the console floppy from the drive.
9. Insert a blank floppy diskette on which to build a new console floppy diskette.

10. Copy the files from your Files-11 directory to the blank floppy using the CONSCOPY.COM command procedure. Directions for using this command procedure are outlined in Section 6.1.
11. If you want to, you can delete the files in the Files-11 directory and the directory itself.
12. If you had to build a new console floppy diskette, shutdown and reboot your system.

9.3.2.3 CI Exerciser Program -- Run CI Exerciser program EVXCI per the Installing and Running CI Exerciser Software (AV-T637A-TE) procedure supplied in the CI780 software box for operating instructions.

9.3.2.4 UETP -- Run UETP on each VAX node where a CI780 has been installed.

NOTE

Refer to the VAX/VMS UETP User's Guide  
(AA-D643C-TE) for operating  
instructions.